



**A SEMI-ANNUAL AQUATIC MONITORING REPORT FOR A
SURFACE MINE PERMIT (DMLR # 1101760) LOCATED NEAR
ROARING FORK IN WISE COUNTY, VIRGINIA**

**Prepared for:
Red River Coal Company, Inc**

**Authored by:
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ATS PROJECT NO. 1199.01

October 2013

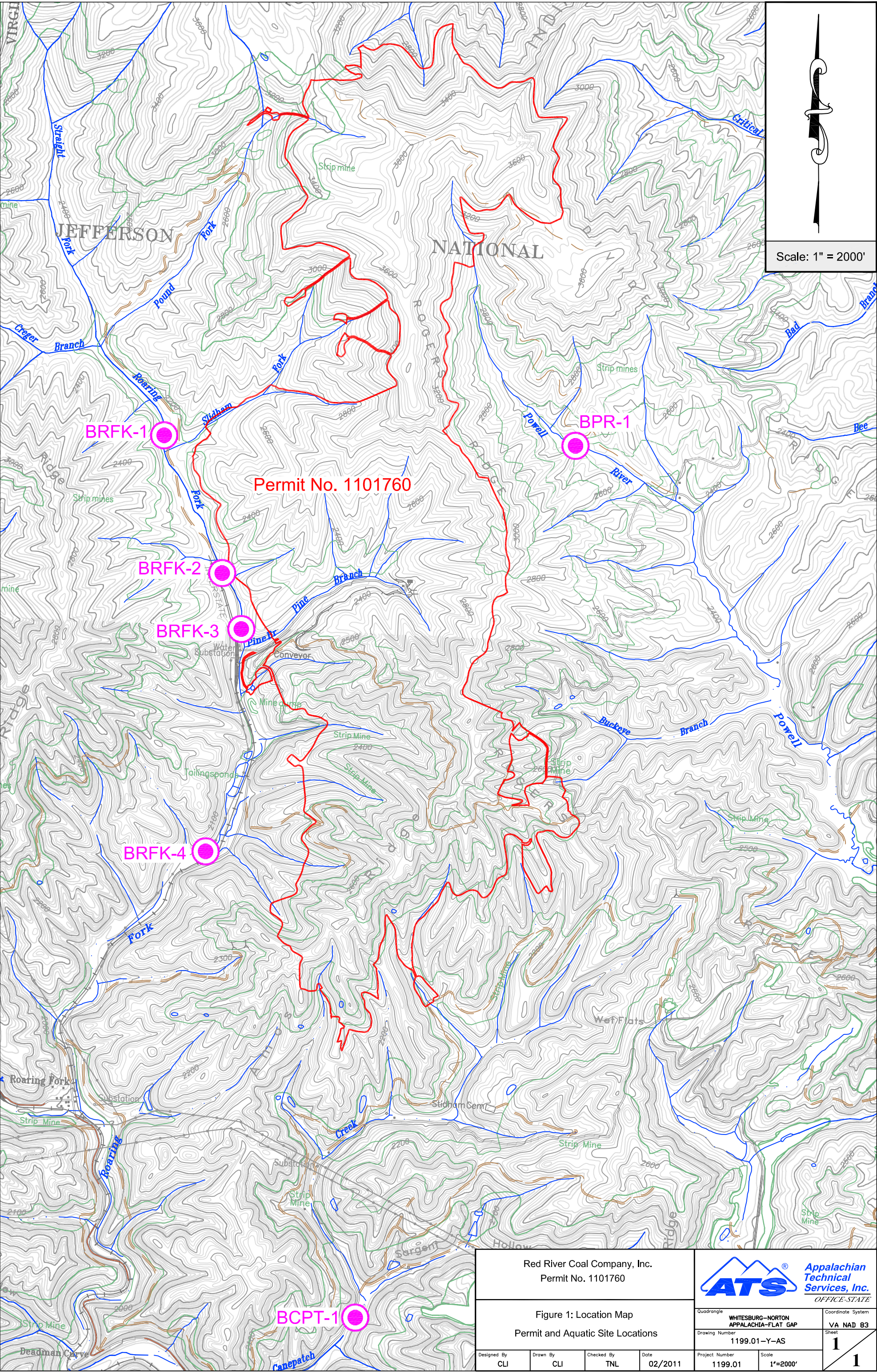
I. INTRODUCTION


Appalachian Technical Services, Inc. was contracted by Red River Coal Company, Inc to conduct ongoing semi-annual (spring and fall) aquatic monitoring at six sites near Roaring Fork in Wise County, Virginia. This report represents the fall 2013 aquatic biological assessments of six sample sites. The permit boundary and sample site locations are shown on the attached topographical map in Figure 1.

II. METHODS

General locations of all sample sites were selected by a Virginia DMLR biologist. However, the exact site locations may have been relocated by ATS senior biologists due to site conditions (*i.e.* low flow, lack of riffle habitat, etc.) and accessibility. Aquatic sampling site BRFK-1 was located on Roaring Fork approximately 50 m upstream of the confluence with Stidham Fork (37.01201; 82.72937). Aquatic sampling site BRFK-2 was located on Roaring Fork approximately 400 m upstream of sample site BFRK-3 (37.00596; 82.72571). Aquatic sampling site BRFK-3 was located on Roaring Fork approximately 50 m upstream of the confluence to Pine Branch (37.00011; 82.72237). Aquatic sampling site BRFK-4 was located southeast of the permit on Roaring Fork approximately 450 m downstream of a series of sediment ponds (39.98557; 82.72422). Aquatic sampling site BCPT-1 was southeast of the permit and located on Canepatch Creek approximately 100 m downstream of the confluence to Sargent Hollow (36.95584; 82.71094). Aquatic sampling site BPR-1 was located to the east of the permit boundary in the upper headwaters of the Powell River approximately 50 m upstream of Red River Coal Company's haulroad (37.01277; 82.69608).

Data collections for the aquatic monitoring consisting of habitat data, macroinvertebrates, grab sample and physiochemical water quality data were collected on 05 and 06 September 2013 by ATS Biological Technicians James Breeding and Brian Bledsoe.



Red River Coal Company, Inc. Permit No. 1101760				 Appalachian Technical Services, Inc. <small>OFFICE-STATE</small>	
Figure 1: Location Map Permit and Aquatic Site Locations				Quadrangle WHITESBURG-NORTON APPALACHIA-FLAT GAP	Coordinate System VA NAD 83
				Drawing Number 1199.01-Y-AS	Sheet 1
Designed By CLI	Drawn By CLI	Checked By TNL	Date 02/2011	Project Number 1199.01	Scale 1"=2000'
				1	

A. Habitat Assessments

Rapid Bioassessment Protocol (RBP) high gradient data sheets were used to assess the habitat for each stream. The RBP sheets score each site's habitat based on 10 criteria with 1 - 20 possible points each (for a max total of 200). Based on the *2008 Methods for Assessing Biological Integrity of Surface Waters in Kentucky, Revision 3* (KDOW 2008), stream habitat in the central Appalachians Ecoregion is considered not supporting its designated use if the total score is less than or equal to 116 total points. Habitat must score 117 – 159 to achieve a partially supporting criterion. To qualify as fully supporting habitat, it must score at least 160 total points. Copies of the stream habitat data sheets are attached in Appendix A.

B. Aquatic Macroinvertebrates

Macroinvertebrates were collected using the single habitat approach as described in sections 7.1.1 and 7.3.1 of the *Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition* (Barbour et al. 1999).

Macroinvertebrates were collected by agitating a riffle area of 0.25 meters in front of a standard size (500 Φ m mesh) kicknet. This process was repeated eight times to achieve 2 square meters of sample area. Upon collection, samples from each site were placed in individual containers of 95% ethyl alcohol, labeled, and returned to the lab.

Subsampling procedures followed methods within Appalachian Technical Services, Inc.'s Virginia Department of Environmental Quality approved *Quality Assurance Project Plan for Biological Monitoring, 2010* and resulted in the identification of approximately 110 ($\pm 10\%$) individuals. All macroinvertebrates were identified by a North American Benthological Society certified taxonomist to family level with the exception of Chironomidae and Oligochaeta.

Macroinvertebrate metrics were calculated based on the methods included in A *Stream Condition Index for Virginia Non-Coastal Streams* (Tetra Tech, Inc. 2003). ATS biologists used the Ecological Data Application System (EDAS) to statistically rarify the samples to 110 organisms and calculate VSCI scores. The VSCI is used to compare streams to reference conditions to evaluate a streams current health. A stream must score a 61 or above to qualify as acceptable water quality. In order to calculate the VSCI the following metrics were calculated from the family level aquatic macroinvertebrate data: Taxa richness; Ephemeroptera, Plecoptera, Trichoptera (EPT) Index; Percent Ephemeroptera; Percent Plecoptera + Trichoptera (less Hydropsychidae); Percent Scrapers; Percent Chironomidae; Percent of top two dominant families; and Family Biotic Index (FBI). Tables with the macroinvertebrate data are attached in Appendix B.

C. Physiochemical Water Data

Prior to any field data collections, all handheld meters were calibrated. Four water quality parameters (specific conductance, dissolved oxygen, pH, and temperature) were analyzed using a handheld meter (YSI Pro Plus). Upon return to the lab all meters received a post-calibration check to ensure validity of all measurements recorded.

In addition to handheld meters, a surface water grab sample was collected at each sample site and delivered to Environmental Monitoring Inc. for analysis. Parameters analyzed were Acidity, Alkalinity (Bicarbonate), Alkalinity (Carbonate), Total Alkalinity, Hardness, Total Iron, Total Manganese, Nitrate, Nitrite, Total Cyanide, Total Dissolved Solids, Total Phenols, Total Suspended Solids, Total Boron, Total Magnesium, Total Aluminum, Total Antimony, Total Arsenic, Total Barium, Total Beryllium, Total Cadmium, Total Chromium, Total Cobalt, Total Copper, Total Lead, Total Nickel, Total Selenium, Total Silver, Total Thallium, Total Zinc, Total Mercury,

Chloride, Sulfate, and Dissolved Organic Carbon. Grab sample analysis data can be found in Appendix C.

III. RESULTS

A. *Habitat Assessments*

The stream habitat at BRFK-1 scored 139 of 200 (Appendix A), indicating the habitat is partially supporting its designated use. The stream was approximately 25 feet wide and characterized mostly by a series of riffles and runs (Figures 2 and 3). Flow occupied >75% of the stream channel. Embeddedness was suboptimal with approximately 25 to 50% of the substrate particles surrounded by fine sediment. The water was clear but there was moderate deposition of sediment within the streambed. The stream banks were moderately stable and with good riparian zones.

The stream habitat at BRFK-2 scored 130 of 200 (Appendix A), indicating the habitat is partially supporting its designated use. The stream was approximately 15 feet wide and characterized mostly by a series of riffles and runs (Figures 4 and 5). Flow occupied >75% of the stream channel. Embeddedness was suboptimal with 25 to 50% of the substrate particles surrounded by fine sediment. The water was clear but there was moderate deposition of sediment within the streambed. The stream banks were moderately stable but the right bank had a narrow riparian zone.

The stream habitat at BRFK-3 scored 130 of 200 (Appendix A), indicating the habitat is partially supporting its designated use. The stream was approximately 15 feet wide and characterized mostly by a series of riffles and runs (Figures 6 and 7). Flow occupied >75% of the stream channel. Embeddedness was suboptimal with 25 to 50% of the substrate particles surrounded by fine sediment. The coloration of the water was clear and there was evidence of slight siltation within the streambed. The stream banks were moderately stable but the right bank had a narrow riparian zone.

The stream habitat at BRFK-4 scored 144 of 200 (Appendix A), indicating the habitat is partially supporting its designated use. The stream was approximately 25 feet wide and characterized mostly by a series of riffles and runs (Figures 8 and 9). Flow occupied >75% of the stream channel. Embeddedness was suboptimal with approximately 25 to 50% of the substrate particles surrounded by fine sediment. The coloration of the water was clear but there was evidence of moderate sedimentation within the streambed. Both stream banks had suboptimal vegetation and good riparian zones.

The stream habitat at BCPT-1 scored 128 of 200 (Appendix A), indicating the habitat is partially supporting its designated use. The stream was approximately 15 feet wide and characterized mostly by a series of riffles and runs (Figures 10 and 11). Flow occupied >75% of the stream channel. Embeddedness was suboptimal with 25 to 50% of the substrate particles surrounded by fine sediment. The coloration of the water was clear but there was evidence of moderate sedimentation within the streambed. The stream banks were moderately unstable and with good riparian zones.

The stream habitat at BPR-1 scored 139 of 200 (Appendix A), indicating the habitat is partially supporting its designated use. The stream was approximately 4 feet wide and characterized mostly by a series of runs and riffles (Figures 12 and 13). Flow occupied >75% of the stream channel. Embeddedness was suboptimal with approximately 25 to 50% of the substrate particles surrounded by fine sediment. The coloration of the water was clear but there was evidence of moderate deposition of sediment within the streambed. The stream banks were unstable but with good riparian areas.

B. Macroinvertebrates

Sample sites BRFK-2 and BCPT-1 had the highest Taxa Richness (Tables 1 and 2). Sample site BRFK-1 had the lowest Taxa Richness (Tables 1 and 2). Sample site

BPR-1 had the lowest FBI score (1.93), indicating excellent water quality with organic pollution unlikely (Table 2). FBI scores for the six sample sites indicated fairly poor (5.87) to excellent (1.93) water quality (Table 2). VSCI scores for the six aquatic sample sites ranged from a low of 28.19 (BRFK-3) to a high of 56.91 (BPR-1) (Table 2).

C. Physiochemical Water Data

All handheld meters passed post-calibration tests. Specific conductances for the six sites ranged from 910 μ S (BPR-1) to 1316 μ S (BRFK-2) (Table 3). The results of the water chemistry samples for each site are attached in Appendix C. All other parameters recorded appeared to be within normal limits.

IV. CONCLUSION

Based on RBP habitat data, all six sample sites appear to be somewhat impaired. Habitat assessments revealed that the habitat was marginal to suboptimal at all six sample sites. All six sample sites had a VSCI score below the unimpaired threshold of 61. All the sample sites had low; Taxa Richness, EPT Richness, percent Ephemeroptera, percent PT-Hydropsychidae, percent scrapers, and high percent two dominants. These low parameter indices may have contributed to the sample sites receiving poor VSCI scores. All water parameters recorded with a handheld meter appeared to be within normal limits with an exception of elevated specific conductances at all six sample sites.



Figure 2: BRFK-1 upstream view



Figure 3: BRFK-1 downstream view



Figure 4: BRFK-2 upstream view



Figure 5: BRFK-2 downstream view



Figure 6: BRFK-3 upstream view



Figure 7: BRFK-3 downstream view



Figure 8: BRFK-4 upstream view



Figure 9: BRFK-4 downstream view



Figure 10: BCPT-1 upstream view



Figure 11: BCPT-1 downstream view



Figure 12: BPR-1 upstream view



Figure 13: BPR-1 downstream view

Literature Cited

- Barbour, M. T., J. Gerritsen, B. D. Snyder, and J. B. Stribling. 1999. Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water; Washington, D.C.
- Kentucky Division of Water (KDOW), 2008. Methods for assessing biological integrity of surface waters in Kentucky, Revision 3. Kentucky Department of Environmental Protection, Division of Water, Frankfort, Kentucky.
- Tetra Tech, Inc. 2003. A Stream Condition Index for Virginia Non-Coastal Streams. Tetra Tech, Inc. Owings Mills, Maryland. Prepared for Virginia Department of Environmental Quality, Richmond, Virginia.

APPENDIX A:

RBP DATA

Benthic Macroinvertebrate Field Data Sheet (front)

Station ID: 1199-01-BBFK1 Ecoregion: _____ Land Use: _____

Field Team: DEB, BWB Survey Reason: Bio. Monitoring Start Time: 14:20

Stream Name: Rearing Fork Location: 2.5m upstream of pond discharge Finish Time: 14:40

Date: 9/5/13 Latitude: 37.01200 Longitude: 82.72948

Stream Physicochemical

Instrument ID number: YSI-60485 pH: 7.94

Temperature: 17.9 °C Conductivity: 1244 µS/cm

Dissolved Oxygen: 8.12 mg/l

Did instrument pass all post-calibration checks? Y/N

If NO - which parameter(s) failed and action _____

Benthic Macroinvertebrate Collection

Method used (circle one) Single Habitat (Riffle) Multi Habitat (Logs, plants, etc)

Riffle Quality (circle one) Good Marginal Snags Poor Banks None Vegetation

Habitats sampled (circle one) Riffle Area Sampled (sq.m): 2m²

#Jabs _____

Weather Observations

Current Weather (circle one) Cloudy Clear Rain/Snow Foggy

Recent precipitation (circle one) Clear Showers Rain Storms Other _____

Stream flow (circle one) Low Normal Above Normal Flood

INSTREAM WATERSHED FEATURES:

Stream Width 25 ft

Range of Depth 1.0 ft

Average Velocity _____ ft/s

Discharge _____ cfs

Est. Reach Length 100m

LOCAL WATERSHED FEATURES:

Predominant Surrounding Land Use:

☐ Surface Mining ☐ Construction ☐ Forest

☐ Deep Mining ☐ Commercial ☐ Pasture/Grazing

☐ Oil Wells ☐ Industrial ☐ Silviculture

☐ Land Disposal ☐ Row Crops ☐ Urban Runoff/Storm Sewers

Hydraulic Structures:

☐ Dams ☐ Bridge Abutments

☐ Island ☐ Waterfalls

☐ Other _____

Stream Flow:

☐ Dry ☐ Pooled ☐ Low ☒ Normal

☐ High ☐ Very Rapid or Torrential

Stream Type:

☒ Perennial ☐ Intermittent

☐ Ephemeral ☐ Seep

Riparian Vegetation:

Dominant Type:

☒ Trees ☐ Shrubs

☐ Grasses ☐ Herbaceous

Number of strata 3

Dom. Tree/Shrub Taxa

Hemlock

Rododendron

Beach

Canopy Cover:

☒ Fully Shaded (75-100%)

☐ Partially Shaded (50-75%)

☐ Partially Exposed (25-50%)

☐ Fully Exposed (0-25%)

Channel Alterations:

☐ Dredging

☐ Channelization

(☐ Full ☐ Partial)

Substrate ☐ Est. ☐ P.C.

Riffle 80 %

Run 20 %

Pool 5 %

High Gradient Habitat Data Sheet

1. Epifaunal

Substrate/Available Cover

Optimal

Greater than 70% of substrate favorable for epifauna colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are not new fall and not transient).

Suboptimal

40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).

Marginal

20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.

Poor

Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

SCORE 20 19 18 17 16

15 14 13 12 11

10 9 8 7 6

5 4 3 2 1

2. Embeddedness

Optimal

Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.

Suboptimal

Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.

Marginal

Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.

Poor

Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.

SCORE 20 19 18 17 16

15 14 13 12 11

10 9 8 7 6

5 4 3 2 1

3. Velocity/Depth Regime

Optimal

Cover All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). Slow is <0.3 m/s, deep is >0.5

Suboptimal

Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).

Marginal

Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).

Poor

Dominated by 1 velocity/depth regime (usually slow-deep).

SCORE 20 19 18 17 16

15 14 13 12 11

10 9 8 7 6

5 4 3 2 1

4. Sediment Deposition	Optimal Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Suboptimal Some new increased in bar formation, mostly from gravel, sand or fine sediment. 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Marginal Moderate deposition of new gravel, sand or fine sediment on bld and new bars; 30-50% (50-80% for low-gradient) of	Poor Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent.
SCORE	20 19 18 17 16 m/s.	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
5. Channel Flow Status	Optimal Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Suboptimal Water fills >75% of the available channel; or 25% of channel substrate is exposed.	Marginal Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Poor Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
6. Channel Alteration	Optimal Channelization or dredging absent or minimal; stream with normal pattern.	Suboptimal Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Marginal Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Poor Banks shored with gabion or cement over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
7. Frequency of Riffles (or bends)	Optimal Occurrence of riffles relatively frequent ratio of distance b/w. riffled divided by width of the stream <7:1* (generally 5 to 7); variety of habitats if key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Suboptimal Occurrence of riffles infrequently; distance b/w. riffles divided by the width of the stream is b/w. 7 to 15.	Marginal Occasional riffle or bend; bottom contours provide some habitat; distance b/w. riffles divided by the width of the stream is b/w. 15 to 25.	Poor Generally all flat water or shallow riffles; poor habitat; distance b/w. riffles divided by the width of the stream is a ratio of >25%.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
8. Bank Stability (score each bank)	Optimal Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. < 5% of bank affected.	Suboptimal Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Marginal Moderately unstable, 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Poor Unstable; many eroded areas "raw" areas
SCORE RB	10 9	8 7 6	5 4 3	2 1 0
SCORE LB	10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	Optimal More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	Suboptimal 70-90% of stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	Marginal 50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Poor Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 cm or less in average stubble height.
SCORE RB	10 9	8 7 6	5 4 3	2 1 0
SCORE LB	10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank)	Optimal Width of riparian zone >18 m; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Suboptimal Width of riparian zone 12-18 m; human activities have impacted zone only minimally.	Marginal Width of riparian zone 6-12 m; human activities have impacted zone a great deal.	Poor Width of riparian zone <6 m; little or no riparian vegetation due to human activities.
SCORE RB	10 9	8 7 6	5 4 3	2 1 0
SCORE LB	10 9	8 7 6	5 4 3	2 1 0

Benthic Macroinvertebrate Field Data Sheet (front)

Station ID: 1199-01-BRFX2 Ecoregion: _____ Land Use: _____

Field Team: JEB, BWB Survey Reason: Bio. Monitoring Start Time: 8:25

Stream Name: Roaring Fork Location: 100m downstream of pond Finish Time: 8:50

Date: 9/6/13 Latitude: 37.00596 Longitude: 82.72876

Stream Physicochemical

Instrument ID number: YSI-60085 pH: 8.16

Temperature: 17.1 °C Conductivity: 1316 µS/cm

Dissolved Oxygen: 8.06 mg/l Did instrument pass all post-calibration checks? Y/N

If NO - which parameter(s) failed and action

Benthic Macroinvertebrate Collection

Method used (circle one) Single Habitat (Riffle) Multi Habitat (Logs, plants, etc)

Riffle Quality (circle one) Good Marginal Snags Poor Banks None Vegetation

Habitats sampled (circle one) Riffle Area Sampled (sq. m): 2m²

Jabs

Weather Observations

Current Weather (circle one) Clear Cloudy Rain/Snow Foggy

Recent precipitation (circle one) Clear Showers Rain Storms Other

Stream flow (circle one) Low Normal Above Normal Flood

INSTREAM WATERSHED FEATURES:

Stream Width 15 ft Range of Depth 1.0 ft

Average Velocity _____ ft/s Discharge 1 cfs

Est. Reach Length 100m

LOCAL WATERSHED FEATURES:

Predominant Surrounding Land Use:

☐ Surface Mining ☐ Construction ☐ Forest

☐ Deep Mining ☐ Commercial ☐ Pasture/Grazing

☐ Oil Wells ☐ Industrial ☐ Silviculture

☐ Land Disposal ☐ Row Crops ☐ Urban Runoff/Storm Sewers

Hydraulic Structures:

☐ Dams ☐ Bridge Abutments ☐ Island ☐ Waterfalls ☐ Other

Stream Flow:

☐ Dry ☐ Pooled ☐ Low ☐ Normal ☐ Perennial ☐ Intermittent

☐ High ☐ Very Rapid or Torrential ☐ Ephemeral ☐ Seep

Stream Type:

Riparian Vegetation: Dom. Tree/Shrub Taxa

Dominant Type: Blue Birch Sycamore Poplar

☐ Trees ☐ Shrubs ☐ Grasses ☐ Herbaceous

Number of strata 4

Canopy Cover:

☐ Fully Shaded (75-100%) ☐ Dredging

☐ Partially Shaded (50-75%) ☐ Channelization

☐ Partially Exposed (25-50%) ☐ (Full/Partial)

☐ Fully Exposed (0-25%)

Substrate Est. OP.C. Riffle 80 % Run 20 % Pool 0 %

High Gradient Habitat Data Sheet

	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/Available Cover	Greater than 70% of substrate favorable for epifauna colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are not new fall and not transients).	40-70% m/s of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
3. Velocity/Depth Regime	Cover All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). Slow is <0.3 m/s, deep is >0.5	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/depth regime (usually slow-deep).
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1

4. Sediment Deposition	Optimal Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Suboptimal Some new increase in bar formation, mostly from gravel, sand or fine sediment, 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Marginal Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of	Poor Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent.
SCORE	20 19 18 17 16 m/s.	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
5. Channel Flow Status	Optimal Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Suboptimal Water fills >75% of the available channel; or 25% of channel substrate is exposed.	Marginal Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Poor Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
6. Channel Alteration	Optimal Channelization or dredging absent or minimal; stream with normal pattern.	Suboptimal Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Marginal Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Poor Banks shored with gabion or cement over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
7. Frequency of Riffles (or bends)	Optimal Occurrence of riffles relatively frequent, ratio of distance b/w. riffled divided by width of the stream <7:1 (generally 5 to 7); variety of habitats if key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Suboptimal Occurrence of riffles infrequent; distance b/w. riffles divided by the width of the stream is b/w. 7 to 15.	Marginal Occasional riffle or bend; bottom contours provide some habitat; distance b/w. riffles divided by the width of the stream is b/w. 15 to 25.	Poor Generally all flat water or shallow riffles; poor habitat; distance b/w. riffles divided by the width of the stream is a ratio of >25%.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
8. Bank Stability (score each bank)	Optimal Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. < 5% of bank affected.	Suboptimal Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Marginal Moderately unstable, 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Poor Unstable; many eroded areas "raw" areas
SCORE RB	10 9	8 7 6	5 4 3	2 1 0
SCORE LB	10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	Optimal More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	Suboptimal 70-90% of stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	Marginal 50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Poor Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 cm or less in average stubble height.
SCORE RB	10 9	8 7 6	5 4 3	2 1 0
SCORE LB	10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank)	Optimal Width of riparian zone >18 m; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Suboptimal Width of riparian zone 12-18 m; human activities have impacted zone only minimally.	Marginal Width of riparian zone 6-12 m; human activities have impacted zone a great deal.	Poor Width of riparian zone <6 m; little or no riparian vegetation due to human activities.
SCORE RB	10 9	8 7 6	5 4 3	2 1 0
SCORE LB	10 9	8 7 6	5 4 3	2 1 0
SCORE				130

Benthic Macroinvertebrate Field Data Sheet (front)

Station ID: 1199.01-BRFS3 Ecoregion: _____ Land Use: _____

Field Team: JEB, BWD Survey Reason: Bio. Monitoring Start Time: 9:00

Stream Name: Rousing Fork Location: Adjacent to old cde ovens. Finish Time: 9:25

Date: 9/5/13 Latitude: 37.00028 Longitude: 82.72244

Stream Physicochemical

Instrument ID number: YSI-65480 pH: 8.39

Temperature: 16.9 °C Conductivity: 1310 µS/cm

Dissolved Oxygen: 8.24 mg/l Did instrument pass all post-calibration checks? Y/N

IF NO - which parameter(s) failed and action _____

Benthic Macroinvertebrate Collection

Method used (circle one) Single Habitat (Riffle) _____ Multi Habitat _____ (Logs, plants, etc)

Riffle Quality (circle one) Good Marginal Snags _____ Poor Banks _____ None Vegetation _____

Habitats sampled (circle one) Riffle Area Sampled (sq. m): 2m²

#Jabs _____

Weather Observations

Current Weather (circle one) Cloudy Clear Rain/Snow Foggy _____

Recent precipitation (circle one) Clear Showers Rain Storms Other _____

Stream flow (circle one) Low Normal Above Normal Flood _____

INSTREAM WATERSHED FEATURES:

Stream Width 15 ft Range of Depth 1.0 ft

Average Velocity _____ ft/s Discharge _____ cfs

Est. Reach Length 100m

LOCAL WATERSHED FEATURES:

Predominant Surrounding Land Use:

☐ Surface Mining ☐ Construction ☐ Forest

☐ Deep Mining ☐ Commercial ☐ Pasture/Grazing

☐ Oil Wells ☐ Industrial ☐ Silviculture

☐ Land Disposal ☐ Row Crops ☐ Urban Runoff/Storm Sewers

Hydraulic Structures:

☐ Dams ☐ Bridge Abutments ☐ Island ☐ Waterfalls ☐ Other _____

Stream Flow:

☐ Dry ☐ Pooled ☐ Low ☐ Normal ☐ High ☐ Very Rapid or Torrential

Stream Type:

☐ Perennial ☐ Intermittent ☐ Ephemeral ☐ Seep

Riparian Vegetation:

Dominant Type: Rhododendron Poplar sycamore

☐ Trees ☐ Shrubs ☐ Grasses ☐ Herbaceous

Number of strata 4

Channel Alterations:

☐ Dredging ☐ Channelization ☐ (Full) ☐ Partial

Substrate Est. OP.C. Riffle 80 % Run 20 % Pool 0 %

High Gradient Habitat Data Sheet

	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/Available Cover	Greater than 70% of substrate favorable for epifauna colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are not new fall and not transient).	40-70% m/s of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
2. Embeddedness	Optimal Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Suboptimal Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Marginal Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Poor Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
3. Velocity/Depth Regime	Optimal Cover All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). Slow is <0.3 m/s, deep is >0.5	Suboptimal Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Marginal Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Poor Dominated by 1 velocity/depth regime (usually slow-deep).
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1

4. Sediment Deposition	Optimal Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Suboptimal Some new increase in bar formation, mostly from gravel, sand or fine sediment. 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Marginal Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of	Poor Heavy deposits of fine material; increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent.
SCORE	20 19 18 17 16 m/s.	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
5. Channel Flow Status	Optimal Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Suboptimal Water fills >75% of the available channel; or 25% of channel substrate is exposed.	Marginal Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Poor Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
6. Channel Alteration	Optimal Channelization or dredging absent or minimal; stream with normal pattern.	Suboptimal Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Marginal Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Poor Banks shored with gabion or cement over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
7. Frequency of Riffles (or bends)	Optimal Occurrence of riffles relatively frequent ratio of distance b/w. riffled divided by width of the stream <7:1 (generally 5 to 7); variety of habitats key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Suboptimal Occurrence of riffles infrequent; distance b/w. riffles divided by the width of the stream is b/w. 7 to 15.	Marginal Occasional riffle or bend; bottom contours provide some habitat; distance b/w. riffles divided by the width of the stream is b/w. 15 to 25.	Poor Generally all flat water or shallow riffles; poor habitat; distance b/w. riffles divided by the width of the stream is a ratio of >25%.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
8. Bank Stability (score each bank)	Optimal Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. < 5% of bank affected.	Suboptimal Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Marginal Moderately unstable, 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Poor Unstable; many eroded areas "raw" areas
SCORE RB	10 9	8 7 6	5 4 3	2 1 0
SCORE LB	10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	Optimal More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	Suboptimal 70-90% of stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	Marginal 50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Poor Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 cm or less in average stubble height.
SCORE RB	10 9	8 7 6	5 4 3	2 1 0
SCORE LB	10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank)	Optimal Width of riparian zone >18 m; human activities (i.e. parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Suboptimal Width of riparian zone 12-18 m; human activities have impacted zone only minimally.	Marginal Width of riparian zone 6-12 m; human activities have impacted zone a great deal.	Poor Width of riparian zone <6 m; little or no riparian vegetation due to human activities.
SCORE RB	10 9	8 7 6	5 4 3	2 1 0
SCORE LB	10 9	8 7 6	5 4 3	2 1 0
SCORE				130

Benthic Macroinvertebrate Field Data Sheet (front)

Station ID: 1199.01-BRFK4 Ecoregion: _____ Land Use: _____
 Field Team: DOB, BNB Survey Reason: Bio. Monitoring Start Time: 9:55
 Stream Name: Roaring Fork Location: 25m down stream of unnamed tributary Finish Time: 10:15

Date: 1/1 Latitude: 36.98558 Longitude: 82.72430

Stream Physicochemical

Instrument ID number: VSI-60585 pH: 8.40
 Temperature: 16.5 °C Conductivity: 1307 µS/cm
 Dissolved Oxygen: 8.91 mg/l Did instrument pass all post-calibration checks? Y/N
 If NO - which parameter(s) failed and action

Benthic Macroinvertebrate Collection

Method used (circle one) Single Habitat (circle one) Multi Habitat (Logs, plants, etc)
 Riffle Quality (circle one) Good Marginal Poor None
 Habitats sampled (circle one) Riffle Snags Banks Vegetation Area Sampled (sq.m): 2m²
 # Jabs

Weather Observations

Current Weather (circle one) Cloudy Clear Rain/Snow Foggy
 Recent precipitation (circle one) Clear Showers Rain Storms Other
 Stream flow (circle one) Low Normal Above Normal Flood

INSTREAM WATERSHED FEATURES:

Stream Width 25 ft

Range of Depth 2-6 ft

Average Velocity _____ ft/s

Discharge _____ cfs

Est. Reach Length 100m

LOCAL WATERSHED FEATURES:

Predominant Surrounding Land Use:

☐ Surface Mining

☐ Deep Mining

☐ Oil Wells

☐ Land Disposal

☐ Construction

☐ Commercial

☐ Industrial

☐ Row Crops

☐ Forest

☐ Pasture/Grazing

☐ Silviculture

☐ Urban Runoff/Storm Sewers

Hydraulic Structures:

☐ Dams ☐ Bridge Abutments

☐ Island ☐ Waterfalls

☐ Other

Stream Flow:

☐ Dry ☐ Pooled ☐ Low ☐ Normal

☐ High ☐ Very Rapid or Torrential

Stream Type:

☐ Perennial ☐ Intermittent

☐ Ephemeral ☐ Seep

Riparian Vegetation:

Dominant Type:

☐ Trees ☐ Shrubs

☐ Grasses ☐ Herbaceous

Number of strata 3

Dom. Tree/Shrub Taxa

Sycamore

Red Maple

Autumnalis

Canopy Cover:

☐ Fully Shaded (75-100%)

☐ Partially Shaded (50-75%)

☐ Partially Exposed (25-50%)

☐ Fully Exposed (0-25%)

Channel Alterations:

☐ Dredging

☐ Channelization

(☐ Full ☐ Partial)

Substrate Est. OP.C.

Riffle 60 %

Run 40 %

Pool 0 %

High Gradient Habitat Data Sheet

1. Epifaunal

Substrate/Available Cover

Optimal

Greater than 70% of substrate favorable for epifauna colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are not new fall and not transients).

Suboptimal

40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).

Marginal

20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.

Poor

Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

SCORE 20 19 18 17 16

15 14 13 12 11

10 9 8 7 6

5 4 3 2 1

2. Embeddedness

Optimal

Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.

Suboptimal

Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.

Marginal

Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.

Poor

Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.

SCORE 20 19 18 17 16

15 14 13 12 11

10 9 8 7 6

5 4 3 2 1

3. Velocity/Depth Regime

Optimal

Cover All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). Slow is <0.3 m/s, deep is >0.5

Suboptimal

Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).

Marginal

Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).

Poor

Dominated by 1 velocity/depth regime (usually slow-deep).

SCORE 20 19 18 17 16

15 14 13 12 11

10 9 8 7 6

5 4 3 2 1

	Optimal	Suboptimal	Marginal	Poor
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment, 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on bld and new bars; 30-50% (50-80% for low-gradient) of	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
5. Channel Flow Status	Optimal Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Suboptimal Water fills >75% of the available channel; or 25% of channel substrate is exposed.	Marginal Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Poor Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
6. Channel Alteration	Optimal Channelization or dredging absent or minimal; stream with normal pattern.	Suboptimal Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Marginal Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Poor Banks shored with gabion or cement over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
7. Frequency of Riffles (or bends)	Optimal Occurrence of riffles relatively frequent; ratio of distance btw. riffled divided by width of the stream <7:1 (generally 5 to 7); variety of habitats if key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Suboptimal Occurrence of riffles infrequent; distance btw. riffles divided by the width of the stream is btw. 7 to 15.	Marginal Occasional riffle or bend; bottom contours provide some habitat; distance btw. riffles divided by the width of the stream is btw. 15 to 25.	Poor Generally all flat water or shallow riffles; poor habitat; distance btw. riffles divided by the width of the stream is a ratio of >25%.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
8. Bank Stability (score each bank)	Optimal Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. < 5% of bank affected.	Suboptimal Moderately stable; infrequent, small areas of erosion mostly healed over, 5-30% of bank in reach has areas of erosion.	Marginal Moderately unstable, 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Poor Unstable; many eroded areas "raw" areas
SCORE RB	10 9	8 7 6	5 4 3	2 1 0
SCORE LB	10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	Optimal More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	Suboptimal 70-90% of stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	Marginal 50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Poor Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 cm or less in average stubble height.
SCORE RB	10 9	8 7 6	5 4 3	2 1 0
SCORE LB	10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank)	Optimal Width of riparian zone >18 m; human activities (i.e. parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Suboptimal Width of riparian zone 12-18 m; human activities have impacted zone only minimally.	Marginal Width of riparian zone 6-12 m; human activities have impacted zone a great deal.	Poor Width of riparian zone <6 m; little or no riparian vegetation due to human activities.
SCORE RB	10 9	8 7 6	5 4 3	2 1 0
SCORE LB	10 9	8 7 6	5 4 3	2 1 0

Benthic Macroinvertebrate Field Data Sheet (front)

Station ID: 1199.01-BCPT1 Ecoregion: _____ Land Use: _____
 Field Team: DEB, BWB Survey Reason: Bio. Monitoring Start Time: 10:40
 Stream Name: Potomac Fork Location: 100m downstream of pond Finish Time: 11:10

Date: 9/6/13 Latitude: 36.95596 Longitude: 82.71088
 Stream Physicochemical

Instrument ID number: VSE-60485 pH: 8.17
 Temperature: 19.7 °C Conductivity: 918 µS/cm
 Dissolved Oxygen: 7.50 mg/l Did instrument pass all post-calibration checks? Y/N
 If NO - which parameter(s) failed and action

Benthic Macroinvertebrate Collection

Method used (circle one) Single Habitat (Riffle) Multi Habitat (Logs, plants, etc)
 Riffle Quality (circle one) Good Marginal Snags Poor None Vegetation
 Habitats sampled (circle one) Riffle Banks Poor None Vegetation Area Sampled (sq. m): 2m²
 # Jabs

Weather Observations

Current Weather (circle one) Cloudy Clear Rain/Snow Foggy
 Recent precipitation (circle one) Clear Showers Rain Storms Other
 Stream flow (circle one) Low Normal Above Normal Flood
 INSTREAM WATERSHED FEATURES:
 Stream Width 15 ft
 Range of Depth 1.5 ft
 Average Velocity _____ ft/s
 Discharge _____ cfs
 Est. Reach Length 100m
 LOCAL WATERSHED FEATURES:
 Predominant Surrounding Land Use:
☐ Surface Mining ☐ Construction ☐ Forest
☐ Deep Mining ☐ Commercial ☐ Pasture/Grazing
☐ Oil Wells ☐ Industrial ☐ Silviculture
☐ Land Disposal ☐ Row Crops ☐ Urban Runoff/Storm Sewers

Hydraulic Structures:

☐ Dams ☐ Bridge Abutments
☐ Island ☐ Waterfalls
☐ Other

Stream Flow:

☐ Dry ☐ Pooled ☐ Low ☐ Normal
☐ High ☐ Very Rapid or Torrential

Stream Type:

☐ Perennial ☐ Intermittent
☐ Ephemeral ☐ Seep

Riparian Vegetation:

Dominant Type:
☐ Trees ☐ Shrubs
☐ Grasses ☐ Herbaceous
 Number of strata 3

Domin. Tree/Shrub Taxa

Rhododendron
Hemlock
Sycamore
Buckeye

Canopy Cover:

☐ Fully Shaded (75-100%)
☐ Partially Shaded (50-75%)
☐ Partially Exposed (25-50%)
☐ Fully Exposed (0-25%)

Channel Alterations:

☐ Dredging
☐ Channelization
☐ (Full) ☐ Partial

Substrate Est. OP.C.

Riffle 70 %

Run 25 %

Pool 5 %

High Gradient Habitat Data Sheet

1. Epifaunal

Substrate/Available Cover

Optimal
 Greater than 70% of substrate favorable for epifauna colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are not new fall and not transient).

Suboptimal
 40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).

Marginal
 20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.

Poor
 Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

SCORE 20 19 18 17 16

15 14 13 12 11

10 9 8 7 6

5 4 3 2 1

2. Embeddedness

Optimal
 Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.

Suboptimal
 Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.

Marginal
 Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.

Poor
 Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.

SCORE 20 19 18 17 16

15 14 13 12 11

10 9 8 7 6

5 4 3 2 1

3. Velocity/Depth Regime

Optimal
 Cover All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). Slow is <0.3 m/s, deep is >0.5

Suboptimal
 Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).

Marginal
 Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).

Poor
 Dominated by 1 velocity/depth regime (usually slow-deep).

SCORE 20 19 18 17 16

15 14 13 12 11

10 9 8 7 6

5 4 3 2 1

4. Sediment
Deposition

Optimal	Suboptimal	Marginal	Poor
Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increased in bar formation, mostly from gravel, sand or fine sediment, 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on bld and new bars; 30-50% (50-80% for low-gradient) of	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent.

SCORE

20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
m/s.			

5. Channel Flow
Status

Optimal	Suboptimal	Marginal	Poor
Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or 25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.

SCORE

20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
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6. Channel Alteration

Optimal	Suboptimal	Marginal	Poor
Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.

SCORE

20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
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7. Frequency of Riffles
(or bends)

Optimal	Suboptimal	Marginal	Poor
Occurrence of riffles relatively frequent ratio of distance btw. riffled divided by width of the stream <7:1 (generally 5 to 7); variety of habitats if key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance btw. riffles divided by the width of the stream is btw. 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance btw. riffles divided by the width of the stream is btw. 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance btw. riffles divided by the width of the stream is a ratio of >25%.

SCORE

20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
----------------	----------------	------------	-----------

8. Bank Stability
(score each bank)

Optimal	Suboptimal	Marginal	Poor
Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. < 5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over; 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas "raw" areas

SCORE RB

10 9	8 7 6	5 4 3	2 1 0
------	-------	-------	-------

SCORE LB

10 9	8 7 6	5 4 3	2 1 0
------	-------	-------	-------

9. Vegetative
Protection (score each
bank)

Optimal	Suboptimal	Marginal	Poor
More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 cm or less in average stubble height.

SCORE RB

10 9	8 7 6	5 4 3	2 1 0
------	-------	-------	-------

SCORE LB

10 9	8 7 6	5 4 3	2 1 0
------	-------	-------	-------

10. Riparian
Vegetative Zone Width
(score each bank)

Optimal	Suboptimal	Marginal	Poor
Width of riparian zone >18 m; human activities (i.e. parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 m; human activities have impacted zone only minimally.	Width of riparian zone 6-12 m; human activities have impacted zone a great deal.	Width of riparian zone <6 m; little or no riparian vegetation due to human activities.

SCORE RB

SCORE LB

10 9	8 7 6	5 4 3	2 1 0
------	-------	-------	-------

10 9	8 7 6	5 4 3	2 1 0
------	-------	-------	-------

SCORE

128

Benthic Macroinvertebrate Field Data Sheet (front)

Station ID: 1199-01-BPRI Ecoregion: _____ Land Use: _____

Field Team: DEB, BWB Survey Reason: Bio. Monitoring Start Time: 13:20

Stream Name: Powell River Location: 50m upstream of road crossing Finish Time: 13:45

Date: 9/5/13 Latitude: 37.01264 Longitude: 82.69598

Stream Physicochemical

Instrument ID number: YSI-60385 pH: 7.75

Temperature: 16.7 °C Conductivity: 910 µS/cm

Dissolved Oxygen: 7.93 mg/l Did instrument pass all post-calibration checks? Y/N

If NO - which parameter(s) failed and action

Benthic Macroinvertebrate Collection

Method used (circle one) Single Habitat (Riffle) Multi Habitat (Logs, plants, etc)

Riffle Quality (circle one) Good Marginal Snags Poor Banks None Vegetation

Habitats sampled (circle one) # Jabs _____ Area Sampled (sq. m): 2m²

Weather Observations

Current Weather (circle one) Cloudy Clear Rain/Snow Foggy

Recent precipitation (circle one) Clear Showers Rain Storms Other

Stream flow (circle one) Low Normal Above Normal Flood

INSTREAM WATERSHED FEATURES:

Stream Width 4.0 ft

Range of Depth 0.5 ft

Average Velocity _____ ft/s

Discharge _____ cfs

Est. Reach Length 100m

LOCAL WATERSHED FEATURES:

Predominant Surrounding Land Use:

☐ Surface Mining ☐ Construction ☐ Forest

☐ Deep Mining ☐ Commercial ☐ Pasture/Grazing

☐ Oil Wells ☐ Industrial ☐ Silviculture

☐ Land Disposal ☐ Row Crops ☐ Urban Runoff/Storm Sewers

Hydraulic Structures:

☐ Dams ☐ Bridge Abutments

☐ Island ☐ Waterfalls

☐ Other

Stream Flow:

☐ Dry ☐ Pooled ☐ Low ☒ Normal

☐ High ☐ Very Rapid or Torrential

Stream Type:

☐ Perennial ☐ Intermittent

☐ Ephemeral ☐ Seep

Riparian Vegetation:

Dominant Type:

☒ Trees ☐ Shrubs

☐ Grasses ☐ Herbaceous

Number of strata 3

Dom. Tree/Shrub Taxa

Poplar

Birch

Canopy Cover:

☐ Fully Shaded (75-100%)

☐ Partially Shaded (50-75%)

☐ Partially Exposed (25-50%)

☐ Fully Exposed (0-25%)

Channel Alterations:

☐ Dredging

☐ Channelization

(Full/Partial)

Substrate Est. OP.C.

Riffle 70 %

Run 30 %

Pool 0 %

High Gradient Habitat Data Sheet

1. Epifaunal

Substrate/Available Cover

Optimal

Greater than 70% of substrate favorable for epifauna colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are not new fall and not transient).

Suboptimal

40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).

Marginal

20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.

Poor

Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.

SCORE 20 19 18 17 16

15 14 13 12 11

10 9 8 7 6

5 4 3 2 1

2. Embeddedness

Optimal

Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.

Suboptimal

Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.

Marginal

Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.

Poor

Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.

SCORE 20 19 18 17 16

15 14 13 12 11

10 9 8 7 6

5 4 3 2 1

3. Velocity/Depth Regime

Optimal

Cover All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). Slow is <0.3 m/s, deep is >0.5

Suboptimal

Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).

Marginal

Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).

Poor

Dominated by 1 velocity/depth regime (usually slow-deep).

SCORE 20 19 18 17 16

15 14 13 12 11

10 9 8 7 6

5 4 3 2 1

	Optimal	Suboptimal	Marginal	Poor
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment. 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on bld and new bars; 30-50% (50-80% for low-gradient) of	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or 25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.	Banks shored with gabion or cement over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent ratio of distance btw. riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitats if key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.	Occurrence of riffles infrequent; distance btw. riffles divided by the width of the stream is btw. 7 to 15.	Occasional riffle or bend; bottom contours provide some habitat; distance btw. riffles divided by the width of the stream is btw. 15 to 25.	Generally all flat water or shallow riffles; poor habitat; distance btw. riffles divided by the width of the stream is a ratio of >25.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. < 5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable, 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas "raw" areas
SCORE RB	10 9	8 7 6	5 4 3	2 1 0
SCORE LB	10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or non-woody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of stream bank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the stream bank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the stream bank surfaces covered by vegetation; disruption of stream bank vegetation is very high; vegetation has been removed to 5 cm or less in average stubble height.
SCORE RB	10 9	8 7 6	5 4 3	2 1 0
SCORE LB	10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank)	Width of riparian zone >18 m; human activities (i.e. parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 m; human activities have impacted zone only minimally.	Width of riparian zone 6-12 m; human activities have impacted zone a great deal.	Width of riparian zone <6 m; little or no riparian vegetation due to human activities.
SCORE RB	10 9	8 7 6	5 4 3	2 1 0
SCORE LB	10 9	8 7 6	5 4 3	2 1 0

SCORE

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APPENDIX B:

TABLES

Table 1. Quantitative listings of macroinvertebrates collected 05 and 06 September 2012 from six aquatic sample sites for surface mine permit number 1101760 in Wise County, Virginia.

Order	Family	Fall 2012					
		BRFK-1	BRFK-2	BRFK-3	BRFK-4	BCPT-1	BPR-1
Ephemeroptera	Baetidae	1				24	11
	Isonychiidae		1			4	
Plecoptera	Perlodidae						1
	Leuctridae					2	67
	Peltoperlidae				1		
Trichoptera	Hydropsychidae	97	82	53	67	58	19
	Hydroptillidae		1				
	Philopotamidae		4		2	5	1
	Rhyacophilidae	1					
Coleoptera	Elmidae		1		1	3	6
	Dryopidae						1
Diptera	Chironomidae	2	14	25	17	2	1
	Empididae		2	10	2	2	
	Simuliidae		1	1		2	2
	Stratiomyidae						
	Tipulidae	3	2	2	3		2
Odonata	Calopterygidae		1				
	Gomphidae			1			2
Megaloptera	Corydalidae	1				2	
Decapoda	Cambaridae		1	1	1	1	
Veneroida	Spaeriidae					3	
Annelida	Oligochaeta	2	3	17	16		
		107	113	110	110	108	113

Table 2. VSCI metrics calculated from the macroinvertebrates collected 05 and 06 September 2012 at six aquatic sample sites for surface mine permit number 1101760 in Wise County, Virginia

Family Metrics	Fall 2012					
	BRFK-1	BRFK-2	BRFK-3	BRFK-4	BCPT-1	BPR-1
Taxa Richness	7	12	8	9	12	11
EPT Taxa	3	4	1	3	5	5
% Ephemeroptera	0.93	0.88	0	0	25.93	9.73
% PT - Hydropsychidae	0.9	4.4	0	2.7	6.5	61.1
% Scrapers	0	1.77	22.73	0.91	2.78	5.31
% Chironomidae	1.87	12.39	70.91	15.45	1.85	0.88
% 2 Dominant	93.46	84.96	5.87	76.36	75.93	76.11
HBI	5.83	5.76	0	5.77	5.13	1.93
VSCI	29.02	34.98	28.19	32.32	46.31	56.91

Table 3. Physiochemical water data collected 05 and 06 September 2012 at six aquatic sample sites for surface mine permit number 1101760 in Wise County, Virginia.

Parameter	BRFK-1	BRFK-2	BRFK-3	BRFK-4	BCPT-1	BPR-1
Temperature (Celsius)	17.9	17.1	16.9	16.5	19.7	16.7
Specific Conductance (μ s)	1244	1316	1310	1307	918	910
pH	7.94	8.16	8.39	8.4	8.17	7.75
Dissolved Oxygen mg/l)	8.12	8.06	8.24	8.91	7.5	7.93

APPENDIX C:

GRAB SAMPLE ANALYSIS



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Page: 1 of 3

Client Name: RED RIVER COAL COMPANY

Address: P.O. BOX 668

NORTON, VA

24273

Report Date: 09/18/13

Lab Sample No.: **1359591**

Client No.: 95

EMI Project No.: 97

Sample Identification: 1101760 - BPR1

Date Collected: 09/05/13

Time Collected: 1320

Sample Matrix: AQ

Collected By: J. BREEDING

Site Description:

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Acidity, Hot	BDL	mg/l CaCO ₃	1.00	1.00	SM 2310B-2011	9/9/2013	1553	MCF
Alkalinity	129	mg/l CaCO ₃	1.00	1.00	SM 2320B-2011	9/9/2013	1313	MCF
Alkalinity, CO ₃	Not NELAP 0.682	mg/l	0.100		4500-CO ₂ -D	9/11/2013	1150	SAS
Alkalinity, HC0 ₃	Not NELAP 129	mg/l	0.100		4500-CO ₂ -D	9/11/2013	1150	SAS
Bromide	0.050 J	mg/l	0.020	0.200	EPA 300.0	9/12/2013	1828	KMC
Chloride	0.624	mg/l	0.011	0.100	EPA 300.0	9/13/2013	135	KMC
Conductivity	1013	umhos/cm	1.00	1.00	SM 2510B-2011	9/6/2013	1136	THR
Flow, Measured	Not NELAP 94.0	gpm				9/5/2013	1320	FLD
Hardness, Total	528	mg/l CaCO ₃	4.00	4.00	SM 2340 C-2011	9/9/2013	1316	SAS
Nitrate	0.399	mg/l	0.012	0.200	EPA 300.0	9/6/2013	1302	KMC
Nitrite	0.082 J	mg/l	0.016	0.200	EPA 300.0	9/6/2013	1302	KMC
pH	Not NELAP 7.75	STD			SM 4500-H+B-2011	9/5/2013	1320	FLD
Sulfate	372	mg/l	1.03	5.00	EPA 300.0	9/10/2013	1533	KMC
Total Dissolved Solids	714	mg/l	1.00	1.00	SM 2540C-2011	9/6/2013	1010	JRS
Total Suspended Solids	4.40	mg/l	1.00	1.00	SM 2540 D-2011	9/5/2013	2201	BAB

To the best of our knowledge and belief, the collection, preservation, and analysis of all parameters represented by this report have been determined to comply the requirements as specified in 40 CFR, Part 136.

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VA Laboratory ID#: 460038

WV Laboratory ID#: 105

EPA Laboratory ID#: VA00010

The release of this report is authorized by:

R. J. Porter

Technical Director

Flow if Available (GPM): 94.0

Type of Sample: Grab

Temp. if Available (C): 16.7

BDL = Below Detection Limit

Depth if Available (Ft):

FLD = Field Technician

Analysis Package Code: EPA0902R

MR = Multiple analytical runs were used for this result

IV = Flag indicates Insufficient Sample Volume

SV = Sample volume indicated by method not used

PSCN

Rev-7-25-13

J = Flag indicates estimated value below Report Limit

T = Results indicate possible toxicity which is expected to influence reported value.

NA = A result for this analyte is not available.

MI = Matrix Interference - Final result may not be representative.

BQ = Batch QC Outside Acceptable Range

HE = Parameter Hold Time Exceeded

FC = Failure to Comply Current SOP

R = Sample results rejected because of gross deficiencies in QC or method performance.



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Client Name: RED RIVER COAL COMPANY

Address: P.O. BOX 668

NORTON, VA

24273

Report Date: 09/18/13

Lab Sample No.: **1359591**

Client No.: 95

EMI Project No.: 97

Sample Identification: 1101760 - BPR1

Date Collected: 09/05/13

Time Collected: 1320

Sample Matrix: AQ

Site Description:

Collected By: J. BREEDING

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Aluminum, Total	0.116	mg/l	0.0016	0.050	200.7	9/9/2013	1325	AWM
Antimony, Total	BDL	ug/l	0.113	2.00	200.8	9/13/2013	1641	CLS
Arsenic, Total	0.291 J	ug/l	0.154	2.00	200.8	9/13/2013	1641	CLS
Barium, Total	74.0	ug/l	0.171	2.00	200.8	9/13/2013	1641	CLS
Beryllium, Total	BDL	ug/l	0.078	2.00	200.8	9/13/2013	1641	CLS
Boron, Total	0.0090 J	mg/l	0.0061	0.030	200.7	9/10/2013	1343	AWM
Cadmium, Total	BDL	ug/l	0.154	2.00	200.8	9/13/2013	1641	CLS
Chromium, Total	0.225 J	ug/l	0.098	2.00	200.8	9/13/2013	1641	CLS
Cobalt, Total	0.252 J	ug/l	0.143	2.00	200.8	9/13/2013	1641	CLS
Copper, Total	0.460 J	ug/l	0.080	2.00	200.8	9/13/2013	1641	CLS
Iron, Total	0.231	mg/l	0.0089	0.050	200.7	9/9/2013	1325	AWM
Lead, Total	0.151 J	ug/l	0.054	2.00	200.8	9/13/2013	1641	CLS
Magnesium, Total	53.9	mg/l	0.032	0.500	EPA 200.7	9/9/2013	1226	AWM
Manganese, Total	0.021 J	mg/l	0.0023	0.050	200.7	9/9/2013	1325	AWM
Mercury, Total	BDL	ug/l	0.078	0.500	EPA 245.1-REV.3	9/6/2013	1216	SAS
Nickel, Total	0.516 J	ug/l	0.169	2.00	200.8	9/13/2013	1641	CLS
Selenium, Total	1.01 J	ug/l	0.731	2.00	200.8	9/13/2013	1641	CLS



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Client Name: RED RIVER COAL COMPANY

Address: P.O. BOX 668

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24273

Report Date: 09/18/13

Lab Sample No.: **1359591**

Client No.: 95

EMI Project No.: 97

Sample Identification: 1101760 - BPR1

Date Collected: 09/05/13

Time Collected: 1320

Site Description:

Sample Matrix: AQ

Collected By: J. BREEDING

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Silver, Total	BDL	ug/l	0.101	2.00	200.8	9/13/2013	1641	CLS
Thallium, Total	BDL	ug/l	0.076	2.00	200.8	9/13/2013	1641	CLS
Zinc, Total	3.23 J	ug/l	0.328	10.0	200.8	9/14/2013	1456	CLS



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Client Name: RED RIVER COAL COMPANY

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24273

Report Date: 09/18/13

Lab Sample No.: **1359592**

Client No.: 95

EMI Project No.: 97

Sample Identification: 1101760 - BRFK1

Date Collected: 09/05/13

Time Collected: 1420

Sample Matrix: AQ

Collected By: J. BREEDING

Site Description:

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Acidity, Hot	BDL	mg/l CaCO ₃	1.00	1.00	SM 2310B-2011	9/9/2013	1556	MCF
Alkalinity	229	mg/l CaCO ₃	1.00	1.00	SM 2320B-2011	9/9/2013	1317	MCF
Alkalinity, CO ₃	Not NELAP 1.86	mg/l	0.100		4500-CO ₂ -D	9/11/2013	1150	SAS
Alkalinity, HC0 ₃	Not NELAP 227	mg/l	0.100		4500-CO ₂ -D	9/11/2013	1150	SAS
Bromide	0.060 J	mg/l	0.020	0.200	EPA 300.0	9/12/2013	1843	KMC
Chloride	0.858	mg/l	0.055	0.500	EPA 300.0	9/10/2013	1544	KMC
Conductivity	1380	umhos/cm	1.00	1.00	SM 2510B-2011	9/6/2013	1137	THR
Flow, Measured	Not NELAP 2285	gpm				9/5/2013	1420	FLD
Hardness, Total	484	mg/l CaCO ₃	4.00	4.00	SM 2340 C-2011	9/9/2013	1316	SAS
Nitrate	0.328	mg/l	0.012	0.200	EPA 300.0	9/6/2013	1317	KMC
Nitrite	0.112 J	mg/l	0.016	0.200	EPA 300.0	9/6/2013	1317	KMC
pH	Not NELAP 7.94	STD			SM 4500-H+B-2011	9/5/2013	1420	FLD
Sulfate	428	mg/l	1.03	5.00	EPA 300.0	9/10/2013	1544	KMC
Total Dissolved Solids	958	mg/l	1.00	1.00	SM 2540C-2011	9/6/2013	1016	JRS
Total Suspended Solids	4.90	mg/l	1.00	1.00	SM 2540 D-2011	9/5/2013	2204	BAB

To the best of our knowledge and belief, the collection, preservation, and analysis of all parameters represented by this report have been determined to comply the requirements as specified in 40 CFR, Part 136.

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VA Laboratory ID#: 460038

WV Laboratory ID#: 105

EPA Laboratory ID#: VA00010

The release of this report is authorized by:

R. J. Porter

Technical Director

Flow if Available (GPM): 2285.0

Type of Sample: Grab

Temp. if Available (C): 17.9

BDL = Below Detection Limit

Depth if Available (Ft):

FLD = Field Technician

Analysis Package Code: EPA0902R

MR = Multiple analytical runs were used for this result

IV = Flag indicates Insufficient Sample Volume

SV = Sample volume indicated by method not used

PSCN

Rev-7-25-13

J = Flag indicates estimated value below Report Limit

T = Results indicate possible toxicity which is expected to influence reported value.

NA = A result for this analyte is not available.

MI = Matrix Interference - Final result may not be representative.

BQ = Batch QC Outside Acceptable Range

HE = Parameter Hold Time Exceeded

FC = Failure to Comply Current SOP

R = Sample results rejected because of gross deficiencies in QC or method performance.



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24273

Report Date: 09/18/13

Lab Sample No.: **1359592**

Client No.: 95

EMI Project No.: 97

Sample Identification: 1101760 - BRFK1

Date Collected: 09/05/13

Time Collected: 1420

Sample Matrix: AQ

Site Description:

Collected By: J. BREEDING

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Aluminum, Total	0.088	mg/l	0.0016	0.050	200.7	9/9/2013	1327	AWM
Antimony, Total	BDL	ug/l	0.113	2.00	200.8	9/13/2013	1646	CLS
Arsenic, Total	0.243 J	ug/l	0.154	2.00	200.8	9/13/2013	1646	CLS
Barium, Total	29.3	ug/l	0.171	2.00	200.8	9/13/2013	1646	CLS
Beryllium, Total	BDL	ug/l	0.078	2.00	200.8	9/13/2013	1646	CLS
Boron, Total	0.017 J	mg/l	0.0061	0.030	200.7	9/10/2013	1346	AWM
Cadmium, Total	BDL	ug/l	0.154	2.00	200.8	9/13/2013	1646	CLS
Chromium, Total	0.223 J	ug/l	0.098	2.00	200.8	9/13/2013	1646	CLS
Cobalt, Total	0.315 J	ug/l	0.143	2.00	200.8	9/13/2013	1646	CLS
Copper, Total	0.626 J	ug/l	0.080	2.00	200.8	9/13/2013	1646	CLS
Iron, Total	0.454	mg/l	0.0089	0.050	200.7	9/9/2013	1327	AWM
Lead, Total	0.152 J	ug/l	0.054	2.00	200.8	9/13/2013	1646	CLS
Magnesium, Total	52.9	mg/l	0.032	0.500	EPA 200.7	9/9/2013	1231	AWM
Manganese, Total	0.131	mg/l	0.0023	0.050	200.7	9/9/2013	1327	AWM
Mercury, Total	BDL	ug/l	0.078	0.500	EPA 245.1-REV.3	9/6/2013	1216	SAS
Nickel, Total	0.642 J	ug/l	0.169	2.00	200.8	9/13/2013	1646	CLS
Selenium, Total	0.839 J	ug/l	0.731	2.00	200.8	9/13/2013	1646	CLS



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Client Name: RED RIVER COAL COMPANY

Address: P.O. BOX 668

NORTON, VA

24273

Report Date: 09/18/13

Lab Sample No.: **1359592**

Client No.: 95

EMI Project No.: 97

Sample Identification: 1101760 - BRFK1

Date Collected: 09/05/13

Time Collected: 1420

Sample Matrix: AQ

Site Description:

Collected By: J. BREEDING

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Silver, Total	BDL	ug/l	0.101	2.00	200.8	9/13/2013	1646	CLS
Thallium, Total	BDL	ug/l	0.076	2.00	200.8	9/13/2013	1646	CLS
Zinc, Total	4.17 J	ug/l	0.328	10.0	200.8	9/14/2013	1501	CLS



STANDARD WORK REQUIRED
COPY TO CLIENT

SAMPLE LOG SHEET & CHAIN OF CUSTODY

C016694



CUSTOMER INFORMATION: Shaded Areas • LAB INFORMATION: White Areas

ENVIRONMENTAL MONITORING, INCORPORATED

ENVIRONMENTAL CONSULTANTS • ANALYTICAL LABORATORIES

P.O. Box 1190 ▲ Norton, Virginia 24273 ▲ 276-679-6544

* CLIENT: Red River Coal Company BILLING ADDRESS: _____

* CONTACT: _____ CITY: _____

STATE/ZIP _____

PHONE () _____

FAX () _____

Purchase Order No. _____

SAMPLES WILL BE DISPOSED OF IN ACCORDANCE WITH

EMI'S TERMS & CONDITIONS

OR RETURNED TO CLIENT OR

Archive for _____ months

Misc. See List

Total metal Hardness

Dissolved Organic Carbon

Phenols

Cyanide

pH

Temp °C

Flow CFS

* PRESERVATIVE USED:

Preservation checked By Date: 10/1/88

REMARKS

Special Instructions / QC Requirements & Comments

EMI PROJECT MANAGER

EPA Samples

* CUSTOMER SAMPLE

* DATE

* TIME

* SAMPLE No. of

* Cool °C

* HNO₃

* HCl

* H₂SO₄

* Na OH

* Other

* Check Shaded Area for Each Parameter

* Requested on Each Sample

* Write Area - Lab Use Only

* Report to be sent (if different than customer information):

NAME: Travis Love

ADDRESS: tllove@ats-one.com

CITY: _____

STATE/ZIP _____

FAX () _____

Report to be sent (if different than customer information):

NAME: Travis Love

ADDRESS: tllove@ats-one.com

CITY: _____

STATE/ZIP _____

FAX () _____

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Misc. See List

Total metal Hardness

Dissolved Organic Carbon

Phenols

Cyanide

pH

Temp °C

Flow CFS

* PRESERVATIVE USED:

Preservation checked By Date: 10/1/88

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Special Instructions / QC Requirements & Comments

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EPA Samples

* CUSTOMER SAMPLE

* DATE

* TIME

* SAMPLE No. of

* Cool °C

* HNO₃

* HCl

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* Na OH

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Archive for _____ months

Misc. See List

Total metal Hardness

Dissolved Organic Carbon

Phenols

Cyanide

pH

Temp °C

Flow CFS

* PRESERVATIVE USED:

Preservation checked By Date: 10/1/88

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Special Instructions / QC Requirements & Comments

EMI PROJECT MANAGER

EPA Samples

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* DATE

* TIME

* SAMPLE No. of

* Cool °C

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STATE/ZIP _____

PHONE () _____

FAX () _____

Purchase Order No. _____

SAMPLES WILL BE DISPOSED OF IN ACCORDANCE WITH

EMI'S TERMS & CONDITIONS

OR RETURNED TO CLIENT OR

Archive for _____ months

Misc. See List

Total metal Hardness

Dissolved Organic Carbon

Phenols

Cyanide

pH

Temp °C

Flow CFS

* PRESERVATIVE USED:

Preservation checked By Date: 10/1/88

REMARKS

Special Instructions / QC Requirements & Comments

EMI PROJECT MANAGER

EPA Samples

* CUSTOMER SAMPLE

* DATE

* TIME

* SAMPLE No. of

* Cool °C

* HNO₃

* HCl

* H₂SO₄

* Na OH

* Other

* Check Shaded Area for Each Parameter

* Requested on Each Sample

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* Report to be sent (if different than customer information):

NAME: Travis Love

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Certificate of Analysis

Page: 1 of 3

Client Name: RED RIVER COAL COMPANY

Address: P.O. BOX 668

NORTON, VA

24273

Report Date: 10/04/13

Lab Sample No.: **1360005**

Client No.: 95

EMI Project No.: 97

Sample Identification: 1199.01-BRFK2

Date Collected: 09/06/13

Time Collected: 825

Sample Matrix: AQ

Collected By: J BREEDING

Site Description: 1101760

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Acidity, Hot	BDL	mg/l CaCO ₃	1.00	1.00	SM 2310B-2011	9/10/2013	1342	MCF
Alkalinity	202	mg/l CaCO ₃	1.00	1.00	SM 2320B-2011	9/10/2013	1117	MCF
Alkalinity, CO ₃	Not NELAP 2.70	mg/l	0.100		4500-CO ₂ -D	9/10/2013	1128	MCF
Alkalinity, HC0 ₃	Not NELAP 199	mg/l	0.100		4500-CO ₂ -D	9/10/2013	1128	MCF
Bromide	0.060 J	mg/l	0.020	0.200	EPA 300.0	10/2/2013	1647	JLW
Chloride	1.60	mg/l	0.055	0.500	EPA 300.0	9/12/2013	1713	KMC
Conductivity	1491	umhos/cm	1.00	1.00	SM 2510B-2011	9/11/2013	1019	THR
Flow, Measured	Not NELAP 3352	gpm				9/6/2013	825	FLD
Hardness, Total	580	mg/l CaCO ₃	4.00	4.00	SM 2340 C-2011	9/9/2013	1335	SAS
Nitrate	0.382	mg/l	0.012	0.200	EPA 300.0	9/6/2013	1524	KMC
Nitrite	0.083 J	mg/l	0.016	0.200	EPA 300.0	9/6/2013	1524	KMC
pH	Not NELAP 8.16	STD			SM 4500-H+B-2011	9/6/2013	825	FLD
Sulfate	480	mg/l	1.03	5.00	EPA 300.0	9/12/2013	1713	KMC
Total Dissolved Solids	956	mg/l	1.00	1.00	SM 2540C-2011	9/9/2013	1015	JRS
Total Suspended Solids	15.9	mg/l	1.00	1.00	SM 2540 D-2011	9/6/2013	2045	MLS

To the best of our knowledge and belief, the collection, preservation, and analysis of all parameters represented by this report have been determined to comply the requirements as specified in 40 CFR, Part 136.

This report may not be reproduced except in full, without the written approval of the laboratory.



VA Laboratory ID#: 460038

WV Laboratory ID#: 105

EPA Laboratory ID#: VA00010

The release of this report is authorized by:

R. J. Porter

Technical Director

Flow if Available (GPM): 3352.0

Type of Sample: Grab

Temp. if Available (C): 17.1

BDL = Below Detection Limit

Depth if Available (Ft):

FLD = Field Technician

Analysis Package Code: EPA0902R

MR = Multiple analytical runs were used for this result

IV = Flag indicates Insufficient Sample Volume

SV = Sample volume indicated by method not used

PSCN

Rev-7-25-13

J = Flag indicates estimated value below Report Limit

T = Results indicate possible toxicity which is expected to influence reported value.

NA = A result for this analyte is not available.

MI = Matrix Interference - Final result may not be representative.

BQ = Batch QC Outside Acceptable Range

HE = Parameter Hold Time Exceeded

FC = Failure to Comply Current SOP

R = Sample results rejected because of gross deficiencies in QC or method performance.



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Page: 2 of 3

Client Name: RED RIVER COAL COMPANY

Address: P.O. BOX 668

NORTON, VA

24273

Report Date: 10/04/13

Lab Sample No.: **1360005**

Client No.: 95

EMI Project No.: 97

Sample Identification: 1199.01-BRFK2

Date Collected: 09/06/13

Time Collected: 825

Site Description: 1101760

Sample Matrix: AQ

Collected By: J BREEDING

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Aluminum, Total	0.286	mg/l	0.0016	0.050	200.7	9/10/2013	1759	AWM
Antimony, Total	BDL	ug/l	0.113	2.00	200.8	9/17/2013	2327	CLS
Arsenic, Total	0.363 J	ug/l	0.154	2.00	200.8	9/17/2013	2327	CLS
Barium, Total	34.8	ug/l	0.171	2.00	200.8	9/17/2013	2327	CLS
Beryllium, Total	BDL	ug/l	0.078	2.00	200.8	9/17/2013	2327	CLS
Boron, Total	0.017 J	mg/l	0.0061	0.030	200.7	9/10/2013	1434	AWM
Cadmium, Total	BDL	ug/l	0.154	2.00	200.8	9/17/2013	2327	CLS
Chromium, Total	0.430 J	ug/l	0.098	2.00	200.8	9/17/2013	2327	CLS
Cobalt, Total	0.514 J	ug/l	0.143	2.00	200.8	9/17/2013	2327	CLS
Copper, Total	0.937 J	ug/l	0.080	2.00	200.8	9/17/2013	2327	CLS
Iron, Total	0.649	mg/l	0.0089	0.050	200.7	9/10/2013	1759	AWM
Lead, Total	0.393 J	ug/l	0.054	2.00	200.8	9/17/2013	2327	CLS
Magnesium, Total	61.5	mg/l	0.032	0.500	EPA 200.7	9/10/2013	1135	AWM
Manganese, Total	0.112	mg/l	0.0023	0.050	200.7	9/10/2013	1759	AWM
Mercury, Total	BDL	ug/l	0.078	0.500	EPA 245.1-REV.3	9/11/2013	1052	SAS
Nickel, Total	1.22 J	ug/l	0.169	2.00	200.8	9/17/2013	2327	CLS
Selenium, Total	1.51 J	ug/l	0.731	2.00	200.8	9/17/2013	2327	CLS



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Certificate of Analysis

Page: 3 of 3

Client Name: RED RIVER COAL COMPANY

Address: P.O. BOX 668

NORTON, VA

24273

Report Date: 10/04/13

Lab Sample No.: **1360005**

Client No.: 95

EMI Project No.: 97

Sample Identification: 1199.01-BRFK2

Date Collected: 09/06/13

Time Collected: 825

Site Description: 1101760

Sample Matrix: AQ

Collected By: J BREEDING

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Silver, Total	BDL	ug/l	0.101	2.00	200.8	9/17/2013	2327	CLS
Thallium, Total	BDL	ug/l	0.076	2.00	200.8	9/17/2013	2327	CLS
Zinc, Total	5.57 J	ug/l	0.328	10.0	200.8	9/17/2013	2327	CLS



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Certificate of Analysis

Page: 1 of 3

Client Name: RED RIVER COAL COMPANY

Address: P.O. BOX 668

NORTON, VA

24273

Report Date: 10/04/13

Lab Sample No.: **1360006**

Client No.: 95

EMI Project No.: 97

Sample Identification: 1199.01-BRFK3

Date Collected: 09/06/13

Time Collected: 900

Sample Matrix: AQ

Collected By: J BREEDING

Site Description: 1101760

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Acidity, Hot	BDL	mg/l CaCO ₃	1.00	1.00	SM 2310B-2011	9/10/2013	1345	MCF
Alkalinity	200	mg/l CaCO ₃	1.00	1.00	SM 2320B-2011	9/10/2013	1121	MCF
Alkalinity, CO ₃	Not NELAP 4.50	mg/l	0.100		4500-CO ₂ -D	9/10/2013	1128	MCF
Alkalinity, HC0 ₃	Not NELAP 195	mg/l	0.100		4500-CO ₂ -D	9/10/2013	1128	MCF
Bromide	0.060 J	mg/l	0.020	0.200	EPA 300.0	10/2/2013	1702	JLW
Chloride	1.35	mg/l	0.055	0.500	EPA 300.0	9/12/2013	1724	KMC
Conductivity	1452	umhos/cm	1.00	1.00	SM 2510B-2011	9/11/2013	1019	THR
Flow, Measured	Not NELAP 2593	gpm				9/6/2013	900	FLD
Hardness, Total	580	mg/l CaCO ₃	4.00	4.00	SM 2340 C-2011	9/9/2013	1335	SAS
Nitrate	0.405	mg/l	0.012	0.200	EPA 300.0	9/6/2013	1539	KMC
Nitrite	0.098 J	mg/l	0.016	0.200	EPA 300.0	9/6/2013	1539	KMC
pH	Not NELAP 8.39	STD			SM 4500-H+B-2011	9/6/2013	900	FLD
Sulfate	495	mg/l	1.03	5.00	EPA 300.0	9/12/2013	1724	KMC
Total Dissolved Solids	950	mg/l	1.00	1.00	SM 2540C-2011	9/9/2013	1017	JRS
Total Suspended Solids	16.5	mg/l	1.00	1.00	SM 2540 D-2011	9/6/2013	2051	MLS

To the best of our knowledge and belief, the collection, preservation, and analysis of all parameters represented by this report have been determined to comply the requirements as specified in 40 CFR, Part 136.

This report may not be reproduced except in full, without the written approval of the laboratory.



VA Laboratory ID#: 460038

WV Laboratory ID#: 105

EPA Laboratory ID#: VA00010

The release of this report is authorized by:

R. J. Porter

Technical Director

Flow if Available (GPM): 2593.0

Type of Sample: Grab

Temp. if Available (C): 16.9

BDL = Below Detection Limit

Depth if Available (Ft):

FLD = Field Technician

Analysis Package Code: EPA0902R

MR = Multiple analytical runs were used for this result

IV = Flag indicates Insufficient Sample Volume

SV = Sample volume indicated by method not used

PSCN

Rev-7-25-13

J = Flag indicates estimated value below Report Limit

T = Results indicate possible toxicity which is expected to influence reported value.

NA = A result for this analyte is not available.

MI = Matrix Interference - Final result may not be representative.

BQ = Batch QC Outside Acceptable Range

HE = Parameter Hold Time Exceeded

FC = Failure to Comply Current SOP

R = Sample results rejected because of gross deficiencies in QC or method performance.



ENVIRONMENTAL MONITORING, INCORPORATED

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Certificate of Analysis

Page: 2 of 3

Client Name: RED RIVER COAL COMPANY

Address: P.O. BOX 668

NORTON, VA

24273

Report Date: 10/04/13

Lab Sample No.: **1360006**

Client No.: 95

EMI Project No.: 97

Sample Identification: 1199.01-BRFK3

Date Collected: 09/06/13

Time Collected: 900

Site Description: 1101760

Sample Matrix: AQ

Collected By: J BREEDING

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Aluminum, Total	0.261	mg/l	0.0016	0.050	200.7	9/10/2013	1804	AWM
Antimony, Total	BDL	ug/l	0.113	2.00	200.8	9/14/2013	1732	CLS
Arsenic, Total	0.312 J	ug/l	0.154	2.00	200.8	9/14/2013	1732	CLS
Barium, Total	35.3	ug/l	0.171	2.00	200.8	9/14/2013	1732	CLS
Beryllium, Total	BDL	ug/l	0.078	2.00	200.8	9/14/2013	1732	CLS
Boron, Total	0.015 J	mg/l	0.0061	0.030	200.7	9/10/2013	1437	AWM
Cadmium, Total	BDL	ug/l	0.154	2.00	200.8	9/14/2013	1732	CLS
Chromium, Total	0.395 J	ug/l	0.098	2.00	200.8	9/14/2013	1732	CLS
Cobalt, Total	0.428 J	ug/l	0.143	2.00	200.8	9/14/2013	1732	CLS
Copper, Total	0.902 J	ug/l	0.080	2.00	200.8	9/14/2013	1732	CLS
Iron, Total	0.590	mg/l	0.0089	0.050	200.7	9/10/2013	1804	AWM
Lead, Total	0.342 J	ug/l	0.054	2.00	200.8	9/14/2013	1732	CLS
Magnesium, Total	62.2	mg/l	0.032	0.500	EPA 200.7	9/10/2013	1140	AWM
Manganese, Total	0.095	mg/l	0.0023	0.050	200.7	9/10/2013	1804	AWM
Mercury, Total	BDL	ug/l	0.078	0.500	EPA 245.1-REV.3	9/11/2013	1052	SAS
Nickel, Total	1.16 J	ug/l	0.169	2.00	200.8	9/14/2013	1732	CLS
Selenium, Total	1.62 J	ug/l	0.731	2.00	200.8	9/14/2013	1732	CLS



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Certificate of Analysis

Page: 3 of 3

Client Name: RED RIVER COAL COMPANY

Address: P.O. BOX 668

NORTON, VA

24273

Report Date: 10/04/13

Lab Sample No.: **1360006**

Client No.: 95

EMI Project No.: 97

Sample Identification: 1199.01-BRFK3

Date Collected: 09/06/13

Time Collected: 900

Site Description: 1101760

Sample Matrix: AQ

Collected By: J BREEDING

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Silver, Total	BDL	ug/l	0.101	2.00	200.8	9/14/2013	1732	CLS
Thallium, Total	BDL	ug/l	0.076	2.00	200.8	9/14/2013	1732	CLS
Zinc, Total	3.81 J	ug/l	0.328	10.0	200.8	9/17/2013	1345	CLS



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Certificate of Analysis

Page: 1 of 3

Client Name: RED RIVER COAL COMPANY

Address: P.O. BOX 668

NORTON, VA

24273

Report Date: 10/04/13

Lab Sample No.: **1360007**

Client No.: 95

EMI Project No.: 97

Sample Identification: 1199.01-BRFK4

Date Collected: 09/06/13

Time Collected: 955

Sample Matrix: AQ

Site Description: 1101760

Collected By: J BREEDING

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Acidity, Hot	BDL	mg/l CaCO ₃	1.00	1.00	SM 2310B-2011	9/10/2013	1348	MCF
Alkalinity	193	mg/l CaCO ₃	1.00	1.00	SM 2320B-2011	9/10/2013	1124	MCF
Alkalinity, CO ₃	Not NELAP 4.40	mg/l	0.100		4500-CO ₂ -D	9/10/2013	1128	MCF
Alkalinity, HC0 ₃	Not NELAP 188	mg/l	0.100		4500-CO ₂ -D	9/10/2013	1128	MCF
Bromide	0.050 J	mg/l	0.020	0.200	EPA 300.0	10/2/2013	1718	JLW
Chloride	1.34	mg/l	0.055	0.500	EPA 300.0	9/12/2013	1735	KMC
Conductivity	1471	umhos/cm	1.00	1.00	SM 2510B-2011	9/11/2013	1020	THR
Flow, Measured	Not NELAP 3645	gpm				9/6/2013	955	FLD
Hardness, Total	644	mg/l CaCO ₃	4.00	4.00	SM 2340 C-2011	9/9/2013	1335	SAS
Nitrate	0.597	mg/l	0.012	0.200	EPA 300.0	9/6/2013	1555	KMC
Nitrite	0.100 J	mg/l	0.016	0.200	EPA 300.0	9/6/2013	1555	KMC
pH	Not NELAP 8.40	STD			SM 4500-H+B-2011	9/6/2013	955	FLD
Sulfate	456	mg/l	2.07	10.0	EPA 300.0	9/20/2013	2057	KMC
Total Dissolved Solids	1038	mg/l	1.00	1.00	SM 2540C-2011	9/9/2013	1020	JRS
Total Suspended Solids	10.1	mg/l	1.00	1.00	SM 2540 D-2011	9/6/2013	2054	MLS

To the best of our knowledge and belief, the collection, preservation, and analysis of all parameters represented by this report have been determined to comply the requirements as specified in 40 CFR, Part 136.

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VA Laboratory ID#: 460038

WV Laboratory ID#: 105

EPA Laboratory ID#: VA00010

The release of this report is authorized by:

R. J. Porter

Technical Director

Flow if Aavailable (GPM): 3645.0

Type of Sample: Grab

Temp. if Available (C): 16.5

BDL = Below Detection Limit

Depth if Available (Ft):

FLD = Field Technician

Analysis Package Code: EPA0902R

MR = Multiple analytical runs were used for this result

IV = Flag indicates Insufficient Sample Volume

SV = Sample volume indicated by method not used

PSCN

Rev-7-25-13

J = Flag indicates estimated value below Report Limit

T = Results indicate possible toxicity which is expected to influence reported value.

NA = A result for this analyte is not available.

MI = Matrix Interference - Final result may not be representative.

BQ = Batch QC Outside Acceptable Range

HE = Parameter Hold Time Exceeded

FC = Failure to Comply Current SOP

R = Sample results rejected because of gross deficiencies in QC or method performance .



ENVIRONMENTAL MONITORING, INCORPORATED

ENVIRONMENTAL CONSULTANTS ▲ ANALYTICAL LABORATORIES

P.O. BOX 1190 ▲ NORTON, VIRGINIA 24273 ▲ 276/679-6544

Certificate of Analysis

Page: 2 of 3

Client Name: RED RIVER COAL COMPANY

Address: P.O. BOX 668

NORTON, VA

24273

Report Date: 10/04/13

Lab Sample No.: **1360007**

Client No.: 95

EMI Project No.: 97

Sample Identification: 1199.01-BRFK4

Date Collected: 09/06/13

Time Collected: 955

Sample Matrix: AQ

Site Description: 1101760

Collected By: J BREEDING

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Aluminum, Total	0.138	mg/l	0.0016	0.050	200.7	9/10/2013	1802	AWM
Antimony, Total	BDL	ug/l	0.113	2.00	200.8	9/14/2013	1727	CLS
Arsenic, Total	0.263 J	ug/l	0.154	2.00	200.8	9/14/2013	1727	CLS
Barium, Total	36.0	ug/l	0.171	2.00	200.8	9/14/2013	1727	CLS
Beryllium, Total	BDL	ug/l	0.078	2.00	200.8	9/14/2013	1727	CLS
Boron, Total	0.014 J	mg/l	0.0061	0.030	200.7	9/10/2013	1440	AWM
Cadmium, Total	BDL	ug/l	0.154	2.00	200.8	9/14/2013	1727	CLS
Chromium, Total	0.215 J	ug/l	0.098	2.00	200.8	9/14/2013	1727	CLS
Cobalt, Total	0.427 J	ug/l	0.143	2.00	200.8	9/14/2013	1727	CLS
Copper, Total	0.638 J	ug/l	0.080	2.00	200.8	9/14/2013	1727	CLS
Iron, Total	0.350	mg/l	0.0089	0.050	200.7	9/10/2013	1802	AWM
Lead, Total	0.197 J	ug/l	0.054	2.00	200.8	9/14/2013	1727	CLS
Magnesium, Total	65.5	mg/l	0.032	0.500	EPA 200.7	9/10/2013	1158	AWM
Manganese, Total	0.089	mg/l	0.0023	0.050	200.7	9/10/2013	1802	AWM
Mercury, Total	BDL	ug/l	0.078	0.500	EPA 245.1-REV.3	9/11/2013	1052	SAS
Nickel, Total	1.02 J	ug/l	0.169	2.00	200.8	9/14/2013	1727	CLS
Selenium, Total	2.31	ug/l	0.731	2.00	200.8	9/14/2013	1727	CLS



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Certificate of Analysis

Page: 3 of 3

Client Name: RED RIVER COAL COMPANY

Address: P.O. BOX 668

NORTON, VA

24273

Report Date: 10/04/13

Lab Sample No.: **1360007**

Client No.: 95

EMI Project No.: 97

Sample Identification: 1199.01-BRFK4

Date Collected: 09/06/13

Time Collected: 955

Site Description: 1101760

Sample Matrix: AQ

Collected By: J BREEDING

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Silver, Total	BDL	ug/l	0.101	2.00	200.8	9/14/2013	1727	CLS
Thallium, Total	BDL	ug/l	0.076	2.00	200.8	9/14/2013	1727	CLS
Zinc, Total	4.35 J	ug/l	0.328	10.0	200.8	9/17/2013	1340	CLS



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Certificate of Analysis

Page: 1 of 3

Client Name: RED RIVER COAL COMPANY

Address: P.O. BOX 668

NORTON, VA

24273

Report Date: 10/04/13

Lab Sample No.: **1360008**

Client No.: 95

EMI Project No.: 97

Sample Identification: 1199.01-BCPT-1

Date Collected: 09/06/13

Time Collected: 1040

Sample Matrix: AQ

Collected By: J BREEDING

Site Description: 1101760

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Acidity, Hot	BDL	mg/l CaCO ₃	1.00	1.00	SM 2310B-2011	9/10/2013	1351	MCF
Alkalinity	214	mg/l CaCO ₃	1.00	1.00	SM 2320B-2011	9/10/2013	1128	MCF
Alkalinity, CO ₃	Not NELAP 2.93	mg/l	0.100		4500-CO ₂ -D	9/10/2013	1128	MCF
Alkalinity, HC0 ₃	Not NELAP 211	mg/l	0.100		4500-CO ₂ -D	9/10/2013	1128	MCF
Bromide	0.050 J	mg/l	0.020	0.200	EPA 300.0	10/2/2013	1734	JLW
Chloride	1.08	mg/l	0.055	0.500	EPA 300.0	9/12/2013	1746	KMC
Conductivity	1014	umhos/cm	1.00	1.00	SM 2510B-2011	9/11/2013	1021	THR
Flow, Measured	Not NELAP 475	gpm				9/6/2013	1040	FLD
Hardness, Total	440	mg/l CaCO ₃	4.00	4.00	SM 2340 C-2011	9/9/2013	1335	SAS
Nitrate	1.32	mg/l	0.012	0.200	EPA 300.0	9/6/2013	1611	KMC
Nitrite	0.088 J	mg/l	0.016	0.200	EPA 300.0	9/6/2013	1611	KMC
pH	Not NELAP 8.17	STD			SM 4500-H+B-2011	9/6/2013	1040	FLD
Sulfate	287	mg/l	1.03	5.00	EPA 300.0	9/12/2013	1746	KMC
Total Dissolved Solids	700	mg/l	1.00	1.00	SM 2540C-2011	9/9/2013	1021	JRS
Total Suspended Solids	2.20	mg/l	1.00	1.00	SM 2540 D-2011	9/6/2013	2134	MLS

To the best of our knowledge and belief, the collection, preservation, and analysis of all parameters represented by this report have been determined to comply the requirements as specified in 40 CFR, Part 136.

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VA Laboratory ID#: 460038

WV Laboratory ID#: 105

EPA Laboratory ID#: VA00010

The release of this report is authorized by:

R. J. Porter

Technical Director

Flow if Available (GPM): 475.0
Temp. if Available (C): 19.7
Depth if Available (Ft):
Analysis Package Code: EPA0902R

Type of Sample: Grab

BDL = Below Detection Limit

FLD = Field Technician

MR = Multiple analytical runs were used for this result
IV = Flag indicates Insufficient Sample Volume
SV = Sample volume indicated by method not used

J = Flag indicates estimated value below Report Limit

T = Results indicate possible toxicity which is expected to influence reported value.

NA = A result for this analyte is not available.

MI = Matrix Interference - Final result may not be representative.

BQ = Batch QC Outside Acceptable Range

HE = Parameter Hold Time Exceeded

FC = Failure to Comply Current SOP

R = Sample results rejected because of gross deficiencies in QC or method performance.

PSCN

Rev-7-25-13



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Certificate of Analysis

Page: 2 of 3

Client Name: RED RIVER COAL COMPANY

Address: P.O. BOX 668

NORTON, VA

24273

Report Date: 10/04/13

Lab Sample No.: **1360008**

Client No.: 95

EMI Project No.: 97

Sample Identification: 1199.01-BCPT-1

Date Collected: 09/06/13

Time Collected: 1040

Site Description: 1101760

Sample Matrix: AQ

Collected By: J BREEDING

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Aluminum, Total	0.052	mg/l	0.0016	0.050	200.7	9/10/2013	1801	AWM
Antimony, Total	BDL	ug/l	0.113	2.00	200.8	9/14/2013	1810	CLS
Arsenic, Total	0.311 J	ug/l	0.154	2.00	200.8	9/14/2013	1810	CLS
Barium, Total	101	ug/l	0.171	2.00	200.8	9/14/2013	1810	CLS
Beryllium, Total	BDL	ug/l	0.078	2.00	200.8	9/14/2013	1810	CLS
Boron, Total	0.011 J	mg/l	0.0061	0.030	200.7	9/10/2013	1444	AWM
Cadmium, Total	BDL	ug/l	0.154	2.00	200.8	9/14/2013	1810	CLS
Chromium, Total	0.098 J	ug/l	0.098	2.00	200.8	9/14/2013	1810	CLS
Cobalt, Total	0.178 J	ug/l	0.143	2.00	200.8	9/14/2013	1810	CLS
Copper, Total	0.445 J	ug/l	0.080	2.00	200.8	9/14/2013	1810	CLS
Iron, Total	0.341	mg/l	0.0089	0.050	200.7	9/10/2013	1801	AWM
Lead, Total	0.074 J	ug/l	0.054	2.00	200.8	9/14/2013	1810	CLS
Magnesium, Total	52.7	mg/l	0.032	0.500	EPA 200.7	9/10/2013	1144	AWM
Manganese, Total	0.117	mg/l	0.0023	0.050	200.7	9/10/2013	1801	AWM
Mercury, Total	BDL	ug/l	0.078	0.500	EPA 245.1-REV.3	9/11/2013	1052	SAS
Nickel, Total	0.658 J	ug/l	0.169	2.00	200.8	9/14/2013	1810	CLS
Selenium, Total	2.71	ug/l	0.731	2.00	200.8	9/14/2013	1810	CLS



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Certificate of Analysis

Page: 3 of 3

Client Name: RED RIVER COAL COMPANY

Address: P.O. BOX 668

NORTON, VA

24273

Report Date: 10/04/13

Lab Sample No.: **1360008**

Client No.: 95

EMI Project No.: 97

Sample Identification: 1199.01-BCPT-1

Date Collected: 09/06/13

Time Collected: 1040

Site Description: 1101760

Sample Matrix: AQ

Collected By: J BREEDING

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Silver, Total	BDL	ug/l	0.101	2.00	200.8	9/14/2013	1810	CLS
Thallium, Total	BDL	ug/l	0.076	2.00	200.8	9/14/2013	1810	CLS
Zinc, Total	2.03 J	ug/l	0.328	10.0	200.8	9/17/2013	1546	CLS

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Savannah

5102 LaRoche Avenue

Savannah, GA 31404

Tel: (912)354-7858

TestAmerica Job ID: 680-94059-3

Client Project/Site: 95.97

For:

Environmental Monitoring, Inc.

5730 Industrial Park Rd.

Norton, Virginia 24273

Attn: Donna Phillips



Authorized for release by:

9/18/2013 2:56:50 PM

Sheila Hoffman, Project Manager I

sheila.hoffman@testamericainc.com

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results through

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The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Sample Summary

Client: Environmental Monitoring, Inc.
Project/Site: 95.97

TestAmerica Job ID: 680-94059-3

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
680-94059-5	1359591	Water	09/05/13 13:20	09/10/13 10:32
680-94059-6	1359592	Water	09/05/13 14:20	09/10/13 10:32
680-94059-7	1360005	Water	09/06/13 08:25	09/10/13 10:32
680-94059-8	1360006	Water	09/06/13 09:00	09/10/13 10:32
680-94059-9	1360007	Water	09/06/13 09:55	09/10/13 10:32
680-94059-10	1360008	Water	09/06/13 10:40	09/10/13 10:32

Method Summary

Client: Environmental Monitoring, Inc.
Project/Site: 95.97

TestAmerica Job ID: 680-94059-3

Method	Method Description	Protocol	Laboratory
335.4	Cyanide, Total	MCAWW	TAL SAV
420.1	Phenolics, Total Recoverable	MCAWW	TAL SAV
SM 5310B	Organic Carbon, Dissolved (DOC)	SM	TAL SAV

Protocol References:

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater",

Laboratory References:

TAL SAV = TestAmerica Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858

Definitions/Glossary

Client: Environmental Monitoring, Inc.
Project/Site: 95.97

TestAmerica Job ID: 680-94059-3

Qualifiers

General Chemistry

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U	Indicates the analyte was analyzed for but not detected.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: Environmental Monitoring, Inc.
Project/Site: 95.97

TestAmerica Job ID: 680-94059-3

Client Sample ID: 1359591 -1101760 - BPR1

Lab Sample ID: 680-94059-5

Date Collected: 09/05/13 13:20

Matrix: Water

Date Received: 09/10/13 10:32

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	0.0025	U	0.010	0.0025	mg/L	-	09/11/13 07:36	09/12/13 10:42	1
Phenolics, Total Recoverable	0.031	J	0.050	0.025	mg/L	-	09/12/13 10:27	09/13/13 10:47	1

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dissolved Organic Carbon	1.4		1.0	0.50	mg/L	-		09/18/13 08:19	1

Client Sample ID: 1359592 -1101760 - BRFK1

Lab Sample ID: 680-94059-6

Date Collected: 09/05/13 14:20

Matrix: Water

Date Received: 09/10/13 10:32

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	0.0025	U	0.010	0.0025	mg/L	-	09/11/13 07:36	09/12/13 10:43	1
Phenolics, Total Recoverable	0.028	J	0.050	0.025	mg/L	-	09/12/13 10:27	09/13/13 10:47	1

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dissolved Organic Carbon	1.5		1.0	0.50	mg/L	-		09/17/13 19:07	1

Client Sample ID: 1360005 -1199.01-BRFBK2

Lab Sample ID: 680-94059-7

Date Collected: 09/06/13 08:25

Matrix: Water

Date Received: 09/10/13 10:32

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	0.0038	J	0.010	0.0025	mg/L	-	09/11/13 07:36	09/12/13 10:44	1
Phenolics, Total Recoverable	0.025	U	0.050	0.025	mg/L	-	09/12/13 10:27	09/13/13 10:47	1

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dissolved Organic Carbon	1.5		1.0	0.50	mg/L	-		09/17/13 19:25	1

Client Sample ID: 1360006 -1199.01-BRFBK3

Lab Sample ID: 680-94059-8

Date Collected: 09/06/13 09:00

Matrix: Water

Date Received: 09/10/13 10:32

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	0.0033	J	0.010	0.0025	mg/L	-	09/11/13 09:30	09/12/13 10:47	1
Phenolics, Total Recoverable	0.043	J	0.050	0.025	mg/L	-	09/12/13 10:27	09/13/13 10:47	1

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dissolved Organic Carbon	1.2		1.0	0.50	mg/L	-		09/17/13 19:42	1

TestAmerica Savannah

Client Sample Results

Client: Environmental Monitoring, Inc.
Project/Site: 95.97

TestAmerica Job ID: 680-94059-3

Client Sample ID: 1360007 -1199.01-BRFK4

Lab Sample ID: 680-94059-9

Date Collected: 09/06/13 09:55

Matrix: Water

Date Received: 09/10/13 10:32

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	0.0025	U	0.010	0.0025	mg/L	-	09/11/13 09:30	09/12/13 10:53	1
Phenolics, Total Recoverable	0.036	J	0.050	0.025	mg/L	-	09/12/13 10:27	09/13/13 10:47	1

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dissolved Organic Carbon	1.6		1.0	0.50	mg/L	-		09/17/13 19:56	1

Client Sample ID: 1360008 -1199.01-BCPT-1

Lab Sample ID: 680-94059-10

Date Collected: 09/06/13 10:40

Matrix: Water

Date Received: 09/10/13 10:32

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	0.0029	J	0.010	0.0025	mg/L	-	09/11/13 09:30	09/12/13 10:54	1
Phenolics, Total Recoverable	0.033	J	0.050	0.025	mg/L	-	09/12/13 10:27	09/13/13 10:47	1

General Chemistry - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dissolved Organic Carbon	2.8		1.0	0.50	mg/L	-		09/17/13 20:14	1

QC Sample Results

Client: Environmental Monitoring, Inc.
Project/Site: 95.97

TestAmerica Job ID: 680-94059-3

Method: 335.4 - Cyanide, Total

Lab Sample ID: MB 680-293120/1-A
Matrix: Water
Analysis Batch: 293439

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 293120

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	0.0025	U	0.010	0.0025	mg/L	—	09/11/13 07:36	09/12/13 10:12	1

Lab Sample ID: LCS 680-293120/2-A
Matrix: Water
Analysis Batch: 293439

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 293120

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cyanide, Total	0.0500	0.0475		mg/L	—	95	90 - 110

Lab Sample ID: MB 680-293162/1-A
Matrix: Water
Analysis Batch: 293439

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 293162

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	0.00343		0.010	0.0025	mg/L	—	09/11/13 09:30	09/12/13 10:45	1

Lab Sample ID: LCS 680-293162/2-A
Matrix: Water
Analysis Batch: 293439

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 293162

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cyanide, Total	0.0500	0.0495		mg/L	—	99	90 - 110

Lab Sample ID: 680-94059-8 MS
Matrix: Water
Analysis Batch: 293439

Client Sample ID: 1360006
Prep Type: Total/NA
Prep Batch: 293162

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Cyanide, Total	0.0033	J	0.0500	0.0516		mg/L	—	97	90 - 110

Lab Sample ID: 680-94059-8 MSD
Matrix: Water
Analysis Batch: 293439

Client Sample ID: 1360006
Prep Type: Total/NA
Prep Batch: 293162

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Cyanide, Total	0.0033	J	0.0500	0.0549		mg/L	—	103	90 - 110	6	20

Method: 420.1 - Phenolics, Total Recoverable

Lab Sample ID: MB 680-293431/1-A
Matrix: Water
Analysis Batch: 293673

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 293431

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Phenolics, Total Recoverable	0.025	U	0.050	0.025	mg/L	—	09/12/13 10:27	09/13/13 10:47	1

TestAmerica Savannah

QC Sample Results

Client: Environmental Monitoring, Inc.
Project/Site: 95.97

TestAmerica Job ID: 680-94059-3

Method: 420.1 - Phenolics, Total Recoverable (Continued)

Lab Sample ID: LCS 680-293431/2-A

Matrix: Water

Analysis Batch: 293673

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 293431

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Phenolics, Total Recoverable	0.250	0.246		mg/L		98	75 - 125

Method: SM 5310B - Organic Carbon, Dissolved (DOC)

Lab Sample ID: MB 680-294041/2-A

Matrix: Water

Analysis Batch: 294378

Client Sample ID: Method Blank

Prep Type: Dissolved

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dissolved Organic Carbon	0.50	U	1.0	0.50	mg/L			09/18/13 02:00	1

Lab Sample ID: LCS 680-294041/1-A

Matrix: Water

Analysis Batch: 294378

Client Sample ID: Lab Control Sample

Prep Type: Dissolved

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Dissolved Organic Carbon	20.0	19.1		mg/L		95	80 - 120
DOC Result 3	20.0	19.0		mg/L		95	80 - 120
DOC Result 2	20.0	19.1		mg/L		96	80 - 120
DOC Result 1	20.0	19.1		mg/L		96	80 - 120

Lab Sample ID: 680-94059-5 DU

Matrix: Water

Analysis Batch: 294378

Client Sample ID: 1359591

Prep Type: Dissolved

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Dissolved Organic Carbon	1.3		1.27		mg/L		0.6	30

TestAmerica Savannah

QC Association Summary

Client: Environmental Monitoring, Inc.
Project/Site: 95.97

TestAmerica Job ID: 680-94059-3

General Chemistry

Prep Batch: 293120

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-94059-5	1359591	Total/NA	Water	Distill/CN	
680-94059-6	1359592	Total/NA	Water	Distill/CN	
680-94059-7	1360005	Total/NA	Water	Distill/CN	
LCS 680-293120/2-A	Lab Control Sample	Total/NA	Water	Distill/CN	
MB 680-293120/1-A	Method Blank	Total/NA	Water	Distill/CN	

Prep Batch: 293162

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-94059-8	1360006	Total/NA	Water	Distill/CN	
680-94059-8 MS	1360006	Total/NA	Water	Distill/CN	
680-94059-8 MSD	1360006	Total/NA	Water	Distill/CN	
680-94059-9	1360007	Total/NA	Water	Distill/CN	
680-94059-10	1360008	Total/NA	Water	Distill/CN	
LCS 680-293162/2-A	Lab Control Sample	Total/NA	Water	Distill/CN	
MB 680-293162/1-A	Method Blank	Total/NA	Water	Distill/CN	

Prep Batch: 293431

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-94059-5	1359591	Total/NA	Water	Distill/Phenol	
680-94059-6	1359592	Total/NA	Water	Distill/Phenol	
680-94059-7	1360005	Total/NA	Water	Distill/Phenol	
680-94059-8	1360006	Total/NA	Water	Distill/Phenol	
680-94059-9	1360007	Total/NA	Water	Distill/Phenol	
680-94059-10	1360008	Total/NA	Water	Distill/Phenol	
LCS 680-293431/2-A	Lab Control Sample	Total/NA	Water	Distill/Phenol	
MB 680-293431/1-A	Method Blank	Total/NA	Water	Distill/Phenol	

Analysis Batch: 293439

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-94059-5	1359591	Total/NA	Water	335.4	293120
680-94059-6	1359592	Total/NA	Water	335.4	293120
680-94059-7	1360005	Total/NA	Water	335.4	293120
680-94059-8	1360006	Total/NA	Water	335.4	293162
680-94059-8 MS	1360006	Total/NA	Water	335.4	293162
680-94059-8 MSD	1360006	Total/NA	Water	335.4	293162
680-94059-9	1360007	Total/NA	Water	335.4	293162
680-94059-10	1360008	Total/NA	Water	335.4	293162
LCS 680-293120/2-A	Lab Control Sample	Total/NA	Water	335.4	293120
LCS 680-293162/2-A	Lab Control Sample	Total/NA	Water	335.4	293162
MB 680-293120/1-A	Method Blank	Total/NA	Water	335.4	293120
MB 680-293162/1-A	Method Blank	Total/NA	Water	335.4	293162

Analysis Batch: 293673

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-94059-5	1359591	Total/NA	Water	420.1	293431
680-94059-6	1359592	Total/NA	Water	420.1	293431
680-94059-7	1360005	Total/NA	Water	420.1	293431
680-94059-8	1360006	Total/NA	Water	420.1	293431
680-94059-9	1360007	Total/NA	Water	420.1	293431
680-94059-10	1360008	Total/NA	Water	420.1	293431
LCS 680-293431/2-A	Lab Control Sample	Total/NA	Water	420.1	293431

TestAmerica Savannah

QC Association Summary

Client: Environmental Monitoring, Inc.
Project/Site: 95.97

TestAmerica Job ID: 680-94059-3

General Chemistry (Continued)

Analysis Batch: 293673 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 680-293431/1-A	Method Blank	Total/NA	Water	420.1	293431

Filtration Batch: 294041

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-94059-5	1359591	Dissolved	Water	FILTRATION	
680-94059-5 DU	1359591	Dissolved	Water	FILTRATION	
680-94059-6	1359592	Dissolved	Water	FILTRATION	
680-94059-7	1360005	Dissolved	Water	FILTRATION	
680-94059-8	1360006	Dissolved	Water	FILTRATION	
680-94059-9	1360007	Dissolved	Water	FILTRATION	
680-94059-10	1360008	Dissolved	Water	FILTRATION	
LCS 680-294041/1-A	Lab Control Sample	Dissolved	Water	FILTRATION	
MB 680-294041/2-A	Method Blank	Dissolved	Water	FILTRATION	

Analysis Batch: 294376

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-94059-5	1359591	Dissolved	Water	SM 5310B	294041

Analysis Batch: 294378

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-94059-5 DU	1359591	Dissolved	Water	SM 5310B	294041
680-94059-6	1359592	Dissolved	Water	SM 5310B	294041
680-94059-7	1360005	Dissolved	Water	SM 5310B	294041
680-94059-8	1360006	Dissolved	Water	SM 5310B	294041
680-94059-9	1360007	Dissolved	Water	SM 5310B	294041
680-94059-10	1360008	Dissolved	Water	SM 5310B	294041
LCS 680-294041/1-A	Lab Control Sample	Dissolved	Water	SM 5310B	294041
MB 680-294041/2-A	Method Blank	Dissolved	Water	SM 5310B	294041

Lab Chronicle

Client: Environmental Monitoring, Inc.
Project/Site: 95.97

TestAmerica Job ID: 680-94059-3

Client Sample ID: 1359591

Date Collected: 09/05/13 13:20

Date Received: 09/10/13 10:32

Lab Sample ID: 680-94059-5

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Distill/CN			293120	09/11/13 07:36	DAM	TAL SAV
Total/NA	Analysis	335.4		1	293439	09/12/13 10:42	DAM	TAL SAV
Total/NA	Prep	Distill/Phenol			293431	09/12/13 10:27	JJW	TAL SAV
Total/NA	Analysis	420.1		1	293673	09/13/13 10:47	JJW	TAL SAV
Dissolved	Filtration	FILTRATION			294041	09/16/13 14:53	CMP	TAL SAV
Dissolved	Analysis	SM 5310B		1	294376	09/18/13 08:19	CMP	TAL SAV

Client Sample ID: 1359592

Date Collected: 09/05/13 14:20

Date Received: 09/10/13 10:32

Lab Sample ID: 680-94059-6

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Distill/CN			293120	09/11/13 07:36	DAM	TAL SAV
Total/NA	Analysis	335.4		1	293439	09/12/13 10:43	DAM	TAL SAV
Total/NA	Prep	Distill/Phenol			293431	09/12/13 10:27	JJW	TAL SAV
Total/NA	Analysis	420.1		1	293673	09/13/13 10:47	JJW	TAL SAV
Dissolved	Filtration	FILTRATION			294041	09/16/13 14:53	CMP	TAL SAV
Dissolved	Analysis	SM 5310B		1	294378	09/17/13 19:07	CMP	TAL SAV

Client Sample ID: 1360005

Date Collected: 09/06/13 08:25

Date Received: 09/10/13 10:32

Lab Sample ID: 680-94059-7

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Distill/CN			293120	09/11/13 07:36	DAM	TAL SAV
Total/NA	Analysis	335.4		1	293439	09/12/13 10:44	DAM	TAL SAV
Total/NA	Prep	Distill/Phenol			293431	09/12/13 10:27	JJW	TAL SAV
Total/NA	Analysis	420.1		1	293673	09/13/13 10:47	JJW	TAL SAV
Dissolved	Filtration	FILTRATION			294041	09/16/13 14:53	CMP	TAL SAV
Dissolved	Analysis	SM 5310B		1	294378	09/17/13 19:25	CMP	TAL SAV

Client Sample ID: 1360006

Date Collected: 09/06/13 09:00

Date Received: 09/10/13 10:32

Lab Sample ID: 680-94059-8

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Distill/CN			293162	09/11/13 09:30	DAM	TAL SAV
Total/NA	Analysis	335.4		1	293439	09/12/13 10:47	DAM	TAL SAV
Total/NA	Prep	Distill/Phenol			293431	09/12/13 10:27	JJW	TAL SAV
Total/NA	Analysis	420.1		1	293673	09/13/13 10:47	JJW	TAL SAV
Dissolved	Filtration	FILTRATION			294041	09/16/13 14:53	CMP	TAL SAV
Dissolved	Analysis	SM 5310B		1	294378	09/17/13 19:42	CMP	TAL SAV

TestAmerica Savannah

Lab Chronicle

Client: Environmental Monitoring, Inc.
Project/Site: 95.97

TestAmerica Job ID: 680-94059-3

Client Sample ID: 1360007

Lab Sample ID: 680-94059-9

Date Collected: 09/06/13 09:55

Matrix: Water

Date Received: 09/10/13 10:32

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Distill/CN			293162	09/11/13 09:30	DAM	TAL SAV
Total/NA	Analysis	335.4		1	293439	09/12/13 10:53	DAM	TAL SAV
Total/NA	Prep	Distill/Phenol			293431	09/12/13 10:27	JJW	TAL SAV
Total/NA	Analysis	420.1		1	293673	09/13/13 10:47	JJW	TAL SAV
Dissolved	Filtration	FILTRATION			294041	09/16/13 14:53	CMP	TAL SAV
Dissolved	Analysis	SM 5310B		1	294378	09/17/13 19:56	CMP	TAL SAV

Client Sample ID: 1360008

Lab Sample ID: 680-94059-10

Date Collected: 09/06/13 10:40

Matrix: Water

Date Received: 09/10/13 10:32

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	Distill/CN			293162	09/11/13 09:30	DAM	TAL SAV
Total/NA	Analysis	335.4		1	293439	09/12/13 10:54	DAM	TAL SAV
Total/NA	Prep	Distill/Phenol			293431	09/12/13 10:27	JJW	TAL SAV
Total/NA	Analysis	420.1		1	293673	09/13/13 10:47	JJW	TAL SAV
Dissolved	Filtration	FILTRATION			294041	09/16/13 14:53	CMP	TAL SAV
Dissolved	Analysis	SM 5310B		1	294378	09/17/13 20:14	CMP	TAL SAV

Laboratory References:

TAL SAV = TestAmerica Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858


 SUBMITTER REQUIRED
COPY TO CLIENT

SAMPLE LOG SHEET & CHAIN OF CUSTODY

C016698



ENVIRONMENTAL MONITORING, INCORPORATED

ENVIRONMENTAL CONSULTANTS ▲ ANALYTICAL LABORATORIES

P.O. Box 1190 ▲ Norton, Virginia 24273 ▲ 276-679-6544

CUSTOMER INFORMATION: Shaded Areas • LAB INFORMATION: White Areas

*CLIENT: Red River Coal Company BILLING ADDRESS: _____

*CONTACT: _____ CITY: _____

STATE/ZIP: _____

PHONE () _____

FAX () _____

Purchase Order No. _____

SAMPLES WILL BE DISPOSED

OF IN ACCORDANCE WITH

EMI'S TERMS & CONDITIONS

OR RETURNED TO CLIENT OR

Archive for _____ months

REMARKS: Flow 6.0m3352259330454795
 Sample Acceptance /
Condition Checklist
(SOP61) followed
Yes or No
If No, Anomaly Report
Required.

 *COLLECTED BY (print) James Breeding & Brian Bledsoe
 COLLECTOR(S) SIGNATURE(S) _____
 TURN-AROUND (circle): 2 Day (Working Days) 3 Day (Working Days) 5 Day (Working Days) 10 Day (Working Days) (15 Working Days)
 Additional Cost May Apply - Any TAT Not Specified Will Be Regular
 *SITE ID: 1101760

 Misc. See List
 Total metal Hardness
 Dissolved Organic Carbon
 Phenols
 Cyanide
 PH
 Temp °C
 Flow CFS

*PRESERVATIVE USED:

Preservation Checked By Date: 11/11/00REMARKS: Flow 6.0m3352259330454795
 Sample Acceptance /
Condition Checklist
(SOP61) followed
Yes or No
If No, Anomaly Report
Required.

*EMI PROJECT NO.	*CUSTOMER SAMPLE	*DATE	*TIME	*SAMPLE	*No. of	*Cool °C	*HNO ₃	*HCl Filt.	*H ₂ SO ₄	*Na OH	*Other	*PH	*Temp °C	*Flow CFS
1. <u>136005</u>	1199-01-BRFLK2	9-6-13	8:25	AA	7	x	x	x	x	x	x	x	x	x
2. <u>1100</u>	1199-01-BRFLK3	9-6-13	9:00	AA	7	x	x	x	x	x	x	x	x	x
3. <u>007</u>	1199-01-BRFLK4	9-6-13	9:55	AA	7	x	x	x	x	x	x	x	x	x
4. <u>108</u>	1199-01-BCPT1	9-6-13	12:40	AA	7	x	x	x	x	x	x	x	x	x
5.														
6.														
7.														
8.														
9.														
10.														

Hazard Information: (circle) Non Hazard Flammable Skin Irritant Poison B Unknown

 *Date/Time 11/13 *Received By (sign) [Signature] *Relinquished by (sign) [Signature]

 *Date/Time 11/13 *Received By (sign) [Signature] *Relinquished by (sign) [Signature]

 *Date/Time 11/13 *Received By (sign) [Signature] *Relinquished by (sign) [Signature]

 *Date/Time 11/13 *Received By (sign) [Signature] *Relinquished by (sign) [Signature]

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 *Date/Time 11/13 *Received By (sign) [Signature] *Relinquished by (sign) [Signature]

 *Date/Time 11/13 *Received By (sign) [Signature] *Relinquished by (sign) [Signature]

 *Date/Time 11/13 *Received By (sign) [Signature] *Relinquished by (sign) [Signature]

 *Date/Time 11/13 *Received By (sign) [Signature] *Relinquished by (sign) [Signature]

 *Date/Time 11/13 *Received By (sign) [Signature] *Relinquished by (sign) [Signature]

Report to be sent (if different than customer information):

NAME: Travis LoveADDRESS: Howe@atsone.com

CITY: _____

STATE/ZIP: _____

FAX () _____

FAX () _____

FAX () _____

FAX () _____

FAX () _____

Customer to complete all shaded categories, use additional forms if necessary

BIN # _____ No. of Containers: _____ Additional Remarks: _____

Certification Summary

Client: Environmental Monitoring, Inc.
Project/Site: 95.97

TestAmerica Job ID: 680-94059-3

Laboratory: TestAmerica Savannah

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
	AFCEE		SAVLAB	
A2LA	DoD ELAP		399.01	07-31-14
A2LA	ISO/IEC 17025		399.01	02-28-15
Alabama	State Program	4	41450	06-30-14
Arkansas DEQ	State Program	6	88-0692	02-01-14 *
California	NELAP	9	3217CA	07-31-14 *
Colorado	State Program	8	N/A	12-31-13
Connecticut	State Program	1	PH-0161	03-31-15
Florida	NELAP	4	E87052	06-30-14
GA Dept. of Agriculture	State Program	4	N/A	12-31-13
Georgia	State Program	4	N/A	06-30-14
Georgia	State Program	4	803	06-30-14
Guam	State Program	9	09-005r	06-17-14
Hawaii	State Program	9	N/A	06-30-14
Illinois	NELAP	5	200022	11-30-13
Indiana	State Program	5	N/A	06-30-14
Iowa	State Program	7	353	07-01-15
Kentucky	State Program	4	90084	12-31-13
Kentucky (UST)	State Program	4	18	06-30-14
Louisiana	NELAP	6	30690	06-30-14
Maine	State Program	1	GA00006	08-16-14
Maryland	State Program	3	250	12-31-13
Massachusetts	State Program	1	M-GA006	06-30-14
Michigan	State Program	5	9925	06-30-14
Mississippi	State Program	4	N/A	06-30-14
Montana	State Program	8	CERT0081	01-01-14
Nebraska	State Program	7	TestAmerica-Savannah	06-30-14
New Jersey	NELAP	2	GA769	06-30-14
New Mexico	State Program	6	N/A	06-30-14
New York	NELAP	2	10842	04-01-14
North Carolina DENR	State Program	4	269	12-31-13
North Carolina DHHS	State Program	4	13701	07-31-14
Oklahoma	State Program	6	9984	08-31-13 *
Pennsylvania	NELAP	3	68-00474	06-30-14
Puerto Rico	State Program	2	GA00006	01-01-14
South Carolina	State Program	4	98001	06-30-13 *
Tennessee	State Program	4	TN02961	06-30-14
Texas	NELAP	6	T104704185-08-TX	11-30-13
USDA	Federal		SAV 3-04	04-07-14
Virginia	NELAP	3	460161	06-14-14
Washington	State Program	10	C1794	06-10-14
West Virginia	State Program	3	9950C	12-31-13
West Virginia DEP	State Program	3	94	09-30-13 *
Wisconsin	State Program	5	999819810	08-31-14
Wyoming	State Program	8	8TMS-L	06-30-14

* Expired certification is currently pending renewal and is considered valid.

TestAmerica Savannah